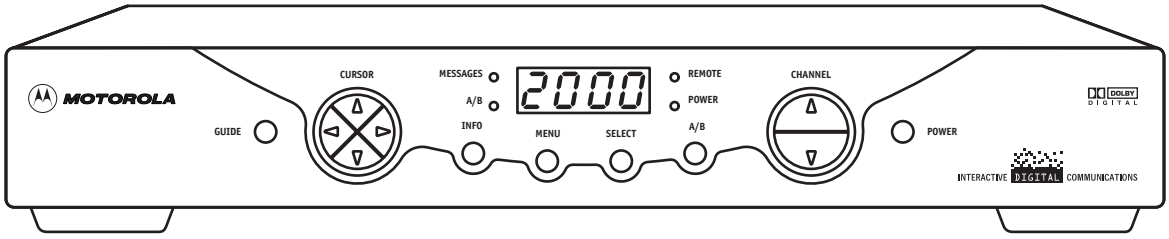
# DCT 2000
# Digital Consumer Terminal

## Installation Manual

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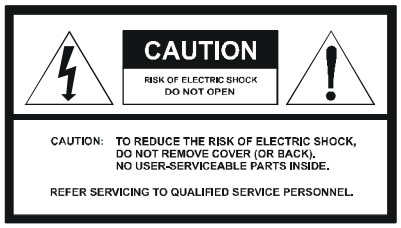
CAUTION
RISK OF ELECTRIC SHOCK
DO NOT OPEN
CAUTION: TO REDUCE THE RISK OF ELECTRIC SHOCK,
DO NOT REMOVE COVER (OR BACK).
NO USER-SERVICEABLE PARTS INSIDE.
REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.

Graphical symbols and supplement warning marking locations on the bottom of the appliance.

This symbol indicates that dangerous voltage levels are present within the equipment. These voltages are not insulated and may be of sufficient strength to cause serious bodily injury when touched. The symbol may also appear on schematics.

This symbol calls attention to a critical procedure, or means refer to the instruction manual for opening or service information. Only qualified service personnel are to install or service the equipment. The symbol may also appear in text and on schematics.

**WARNING:**

**TO PREVENT FIRE OR SHOCK HAZARD, DO NOT EXPOSE THIS APPLIANCE TO RAIN OR MOISTURE.**

**CAUTION:**

**TO PREVENT ELECTRICAL SHOCK, DO NOT USE THIS PLUG WITH AN EXTENSION CORD, RECEPTACLE, OR OTHER OUTLET UNLESS THE BLADES CAN BE FULLY INSERTED TO PREVENT BLADE EXPOSURE.**

**FCC Compliance:** Federal Communications Commission Radio and Television Interface Statement for a Class 'B' Device

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in the residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If the equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Increase the separation between the equipment and the affected receiver
- Connect the equipment on a circuit different from the one the receiver is on
- Ensure that the cover plate for the security card is secured and tight

You may find the following booklet, prepared by the Federal Communication Commission, helpful: *How to Identify and Resolve Radio-TV Interference Problems*, Stock No. 004-000-0342-4, U.S. Government Printing Office, Washington, DC 20402.

Changes or modification not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

**Declaration of Conformity**: According to 47 CFR, Parts 2 and 15 for Class B Personal Computers and Peripherals; and/or CPU Boards and Power Supplies used with Class B Personal Computers, Motorola, Inc., 6450 Sequence Drive, San Diego, CA 92121, 1-800-225-9446, declares under sole responsibility that the product identifies with 47 CFR Part 2 and 15 of the FCC Rules as a Class B digital device. Each product marketed is identical to the representative unit tested and founded to be compliant with the standards. Records maintained continue to reflect the equipment being produced can be expected to be within the variation accepted, due to quantity production and testing on a statistical basis as required by 47 CFR 2.909. Operation is subject to the following condition: This device must accept any interference received, including interference that may cause undesired operation. The above named party is responsible for ensuring that the equipment complies with the standards of 47 CFR, Paragraphs 15.107 to 15.109

**FCC Part 68 Statement:** This equipment complies with part 68 of the FCC rules. On the rear panel of this equipment is a label that contains, among other information, the FCC registration number and ringer equivalence number (REN) for the equipment. If requested, this information must be provided to the telephone company.

The REN is used to determine the quantity of devices that may be connected to the telephone line. Excessive RENs on the telephone line may result in the devices not ringing in response to an incoming call. In most, but not all areas, the sum of the RENs should not exceed five (5.0). To be certain of the number of devices that may be connected to the line, as determined by the total RENs, contact the telephone company to determine the maximum REN for the calling area.

This equipment uses the following USOC jack: RJC. An FCC-compliant telephone cord and modular plug is provided with this equipment. This equipment is designed to be connected to the telephone network or premises wiring using a compatible modular jack that is Part 68 compliant. This equipment cannot be used on telephone company-provided coin services. Connection to Party Line Service is subject to state tariffs.

If this equipment causes harm to the telephone network, the telephone company will notify you in advance that the temporary discontinuance of services may be required. If advance notice isn't practical, the telephone company will notify the customer as soon as possible. Also, you will be advised of your right to file a compliant with the FCC if you believe it is necessary.

The telephone company may make changes in its facilities, equipment, operations, or procedures that could affect the operation of the equipment. If this happens, the telephone company will provide advance notice in order to maintain uninterrupted service.

If the trouble is causing harm to the telephone system, the telephone company may request that you remove the equipment from the network until the problem is resolved.

It is recommended that the customer install an AC surge arrestor in the AC outlet to which this device is connected. This is to avoid damaging the equipment by local lightning strikes and other electrical surges.

**Canadian Compliance:** This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations. Cet appareil numérique de la classe B respects toutes les exigences du Règlement sur le matériel brouilleur du Canada.

**Industry Canada CS-03 Statement:** The Industry Canada label identifies certified equipment. This certification means that the equipment meets certain telecommunications network protective, operational and safety requirements as prescribed in the appropriate Terminal Equipment Technical Requirements document(s). The department does not guarantee that the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. The customer should be aware that compliance with the above conditions might not prevent degradation of service in some situations. Repairs to certified equipment should be coordinated by a representative designated by the supplier. Repairs or alterations made by the user to this equipment, or equipment malfunctions may give the telecommunication company cause to request the user to disconnect the equipment.

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas. Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician, as appropriate.

The Ringer Equivalence Number (REN) of this device is 0.4. The Ringer Equivalence Number (REN) assigned to each terminal device provides an indication of the maximum number of terminals allowed to be connected to a telephone interface. The termination on an interface may consist of any combination of devices subject only to the requirement that the sum of the Ringer Equivalence Numbers of all devices does not exceed 5. The telephone connection arrangement is a CA11A.

**Repairs:** If repair is necessary, call the Motorola Repair Facility at 1-800-227-0450 for a Return for Service Authorization (RSA) number before sending the unit. The RSA number must be prominently displayed on all equipment cartons. Pack the unit securely; enclose a note describing the exact problem, and a copy of the invoice that verifies the warranty status. Ship the unit PRE-PAID to the following address:

Motorola, Inc.
Attn: RSA #_____
c/o Rudolph Miles and Sons
2500 Courage Boulevard
Brownsville, TX 78521

**NOTE TO CATV SYSTEM INSTALLER:** This reminder is provided to call CATV system installer's attention to Article 820-40 of the NEC that provides guidelines for proper grounding and, in particular, specifies that the cable ground shall be connected to the grounding system of the building, as close as possible to the point of cable entry as practical.

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Section 1

# Introduction

The Motorola DCT2000 is an analog/digital terminal designed to support 64 and 256 QAM digital signal formats, and it can be configured to support analog descrambling.

The DCT2000 is compatible with existing Motorola analog and digital set-top terminal products. Existing set-top terminals are not affected by the new data flowing from the system to the DCT2000s.

This manual provides instructions to install the DCT2000.

## Features, Options, and Interfaces

The Motorola DCT2000 offers the following standard features:

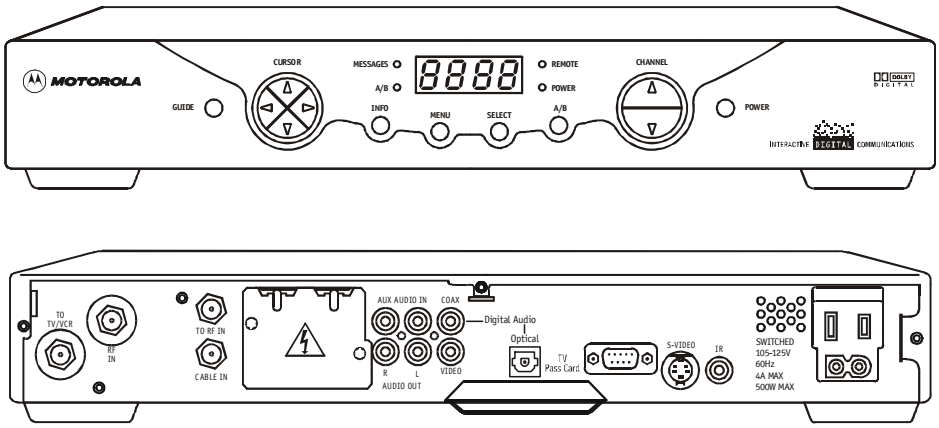
- 54 through 860 MHz integrated tuner
- Integrated RF return (using built-in STARVUE II module)
- RF and baseband audio/ video ports
- Single IR Blaster port (replaces two connectors on DCT 1000/1200 series)
- Auxiliary audio input
- Switched accessory outlet
- RS 232 serial data port (provides a high speed serial data interface)

Optional features include:

- STARFONE II (14.4 kbps) Telco return
- A/B In switch
- RF Bypass switch
- Dual A/B-RF Bypass switch
- IR Blaster cable
- S-Video output
- Dolby® AC-3® audio output (SPDIF Interface)
- Optical Dolby® AC-3® audio output

Figure 1-1 illustrates front and rear views of the DCT2000:

**Figure 1-1**
**DCT2000 advanced set-top terminal**




## Using This Manual

This manual provides instructions to install and configure a DCT2000:

| | |
|---|---|
| **Section 1** | **Introduction** provides a product description, a list of related documentation, the technical helpline telephone number, and the repair/return procedure. |
| **Section 2** | **Overview** describes the DCT2000 terminal and provides an overview of its use. This section also identifies the front-panel displays and switches and describes the rear-panel features. |
| **Section 3** | **Installation** provides instructions on how to install the DCT2000 in a subscriber location and perform operational tests. |
| **Section 4** | **Adding the IR Blaster Option** provides instructions on how to install the IR Blaster option for controlling VCR recording through the DCT2000. |
| **Section 5** | **Troubleshooting** provides guidelines for troubleshooting the equipment. |
| **Appendix A** | **Specifications** provide the technical specifications for the DCT2000. |
| **Appendix B** | **Diagnostics** provide instructions on accessing and interpreting the built-in diagnostics. |
| **Abbreviations and Acronyms** | The **Abbreviations and Acronyms** list contains the full spelling of the short forms used in this manual. |

## Related Documentation

Separate instruction manuals are available for associated components. Although these may be useful, they are not necessary to install or operate the basic DCT2000:

- *DCT2000 User Guide*
- *DCT 1000 Cable Terminal Installation Manual*
- *DRC 425 Remote Control User Guide*
- *DRC 400 Remote Control User Guide*
- *DCT External Add-On Modules Installation Sheet*
- *STARFONE 2 Installation Sheet*

## Document Conventions

Before you begin working with this manual and using the DCT2000, familiarize yourself with the stylistic conventions used in this manual:

| | |
|---|---|
| **SMALL CAPS** | Denotes silk screening on the equipment, typically representing front- and rear-panel controls, input/output (I/O) connections, and LEDs |
| *** (asterisk)** | Indicates that several versions of the same model number exist and the information applies to all models; when the information applies to a specific model, the complete model number is given |
| ***Italic type*** | Used for emphasis |
| `Courier font` | Displayed text |

## If You Need Help

If you need assistance while working with the DCT2000, contact the Motorola Technical Response Center (TRC):

- Inside the U.S.: **1-888-944-HELP** (**1-888-944-4357**)
- Outside the U.S.: **215-323-0044**
- Online: http://www.motorola.com/broadband, click **HTML/Modem Version**, click **Customer Support**, then click **Web Support**.

The TRC is open from 8:00 AM to 7:00 PM Eastern Time, Monday through Friday and 10 AM to 6 PM Eastern Time, Saturday. When the TRC is closed, emergency service *only* is available on a call-back basis. Web Support offers a searchable solutions database, technical documentation, and low priority issue creation/tracking 24 hours per day, 7 days per week. Web Support is available after registering.

## Calling for Repairs

If repair is necessary, call the Motorola Repair Facility at **1-800-227-0450** for a Return for Service Authorization (RSA) number before sending the unit. The RSA number must be prominently displayed on all equipment cartons. The Repair Facility is open from 8:00 AM to 5:00 PM Central Time, Monday through Friday.

When calling from outside the United States, use the appropriate international access code and then call **956-541-0600** to contact the Repair Facility.

When shipping equipment for repair, follow these steps:

1. Pack the unit securely.
2. Enclose a note describing the exact problem. Complete and enclose the checklist provided with the unit.
3. Enclose a copy of the invoice that verifies the warranty status.

Ship the unit **PREPAID** to the following address:

Motorola, Inc.
Broadband Communications Sector
Attn: RSA #_____
c/o Rudolph Miles and Sons
2500 Courage Boulevard
Brownsville, TX 78521

Section 2

# Overview

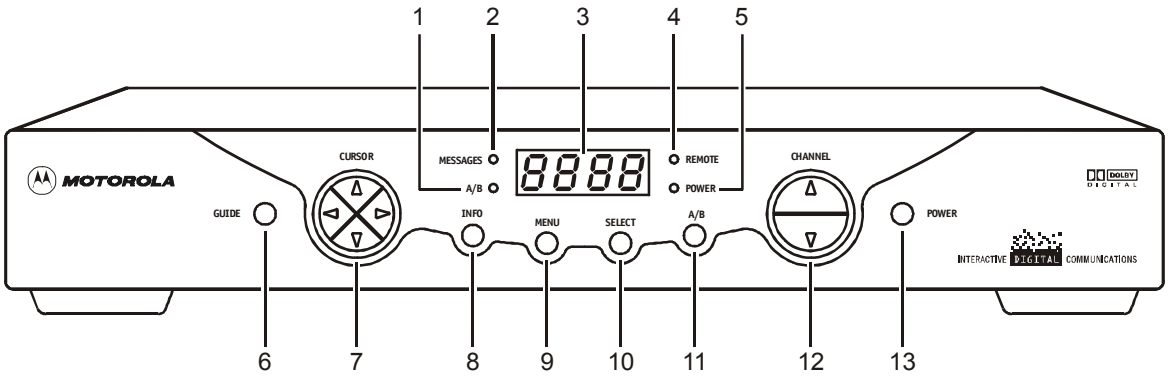
The DCT2000 uses state-of-the-art digital compression technology to provide new revenue generating services. The DCT2000 can be configured to support real time reverse path communications, providing a gateway to interactive services such as Video on Demand (VOD), Internet access, Email, home shopping, and more.

This section provides illustrations and tables showing the DCT2000 controls, displays and connectors. Before you begin to install the DCT2000, familiarize yourself with the various controls and displays.

## Front Panel

Figure 2-1 illustrates the front panel, which contains selection keys, tuning keys, various displays, and the power switch:

**Figure 2-1**
**DCT2000 front panel**




These controls provide minimum, yet functional capability in the event the remote control is lost or temporarily out of service. Functions requiring a numeric entry are not available without a remote control.

Table 2-1 describes the front-panel controls and LEDs:

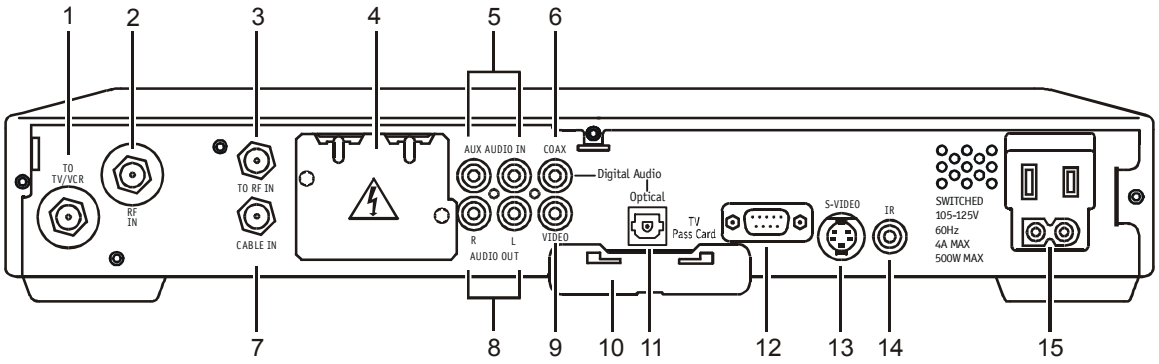
**Table 2-1**
**Front panel**

| Key | Feature | Function |
|---|---|---|
| 1 | A/B | Lights if optional switch is activated |
| 2 | MESSAGES | Lights to indicate that a message is present |
| 3 | | Normally displays current channel number or time of day; in the diagnostic mode, displays diagnostic codes |
| 4 | REMOTE | Flashes when an error-free signal is received from the remote control |
| 5 | POWER | Lights when the unit is on |
| 6 | GUIDE | Displays the electronic program guide (EPG) |
| 7 | CURSOR | Moves the cursor in menu and program guide screens |
| 8 | INFO | Displays current channel and program information |
| 9 | MENU | Displays the Main menu |
| 10 | SELECT | Selects function options and Pay-Per-View (PPV) events and tunes channels from the electronic program guide |
| 11 | A/B | When enabled, this switches an add-on module from one function to another function |
| 12 | CHANNEL | Changes channel up and down |
| 13 | POWER | Turns DCT2000 on/off |

## Rear Panel

Figure 2-2 illustrates the rear panel of the DCT2000, which contains a switched power outlet; connectors for video, audio, and RF cabling; data output connectors; and IR Blaster output connector:

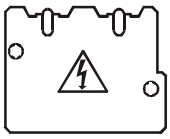
**Figure 2-2**
**DCT2000 rear panel**

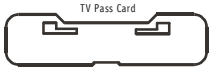
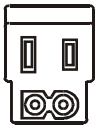



A protective plate covers the rear panel opening when the optional Telco return is not installed. Do not remove the protective plate unless you are installing new hardware in the opening.

Table 2-2 describes each of the rear-panel features:

**Table 2-2**
**Rear panel**

| Key | Item | Function |
|---|---|---|
| 1 | | F-type connector used to connect the DCT2000 to a standard TV or VCR |
| 2 | | F-type connector used for DCT2000 input from the TO RF IN connector |
| 3 | | F-type connector used to connect the TO RF IN port to the RF IN port (output from integrated RF return) |
| 4 |  | Covers slot used for STARFONE option |
| 5 | | RCA jacks for looping through audio from auxiliary audio equipment |
| 6 | | Option to enhance your DCT2000; see, “Options” for more information |
| 7 | | F-type connector used for the coaxial cable input port from plant (input to integrated RF return) |

| Key | Item | Function |
|---|---|---|
| 8 | | Left and right audio RCA jacks used for stereo audio output |
| 9 | | RCA jack used to connect the DCT2000 to a composite (baseband) video TV or a monitor; in some configurations this jack connects to a VCR |
| 10 |  | Cover for an area reserved for future use |
| 11 | | An optional optical connector that provides Dolby Digital or PCM audio. |
| 12 | | Data connector to interface serial data and access the high speed serial interface for high definition decoding |
| 13 | | Option to enhance your DCT2000; see, “Options” for more information |
| 14 | | Mini-phone jack for connecting an optional IR Blaster |
| 15 |  | AC power outlet that can be configured as a switched or unswitched outlet and the two-pronged plug is for attaching a power cord |

# Options

The DCT2000 supports a variety of options enabling your company to offer a system tailored to the individual needs of your subscribers. Figure 2-3 illustrates the options available for the DCT2000:

**Figure 2-3**
**DCT2000 options**

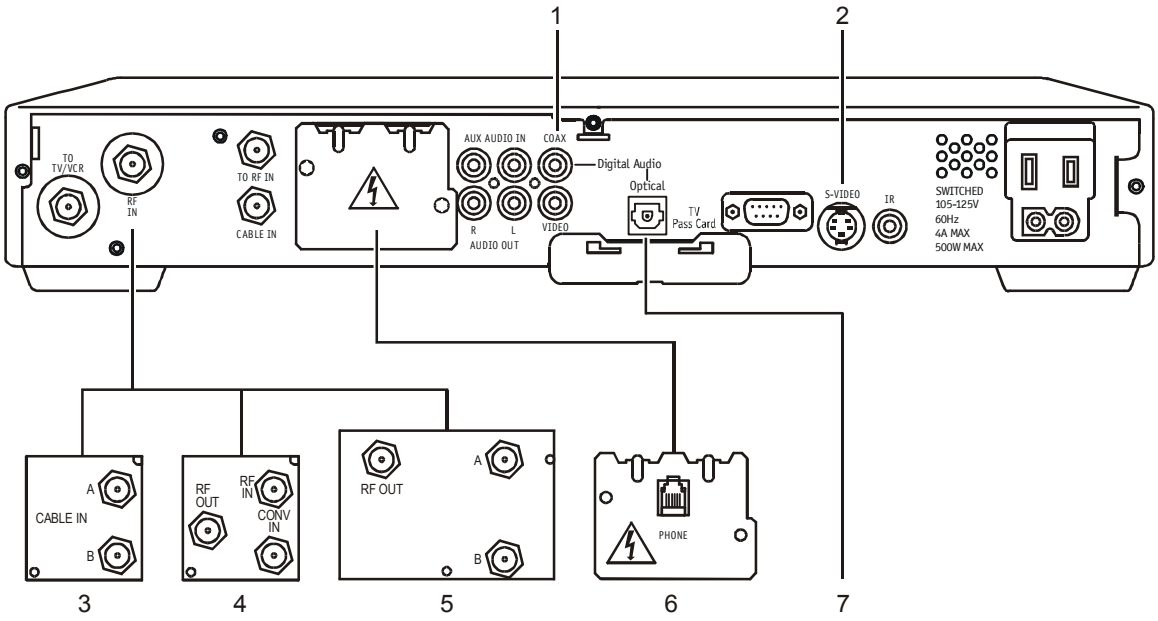
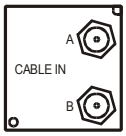
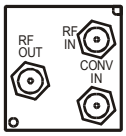
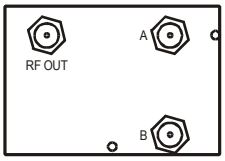
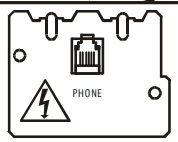



Table 2-3 describes the function of each of the options shown in Figure 2-3:

**Table 2-3**
**Options**

| Key | Option | Name | Function |
|---|---|---|---|
| 1 | | **SPDIF** | Used to deliver Dolby Digital 5.1, Dolby AC3 audio, or PCM audio (digital audio recording) |
| 2 | | **S-VIDEO** | Used for high quality video to external devices such as high-end VCRs or TVs |
| 3 |   | **A/B In** | Used in a dual cable system to receive both cables; verify the location of the A and B connectors on your particular A/B In module |
| 4 |   | **RF Bypass** | Enables the cable signal to bypass the DCT2000 and go directly to a TV or VCR |

| Key | Option | Name | Function |
|---|---|---|---|
| 5 |  | **Dual A/B RF Bypass** | Used in a dual cable system; enables the cable signal on the current side (A or B) to go directly to a TV or VCR |
| 6 |  | **STARFONE** | Used in a two-way addressable system to send Impulse Pay-Per-View (IPPV) information to the DAC 6000 or other controller through the subscriber's telephone hookup |
| 7 | | **Optical** | Used to deliver Dolby Digital or PCM audio through an optical connector to an A/V receiver. |

# Remote Controls

The basic DCT2000 uses the DRC 400 remote control. If your system offers optional interactive applications, such as an interactive program guide, a different remote control may be required. The application provider should supply user instructions for each interactive application.

## DRC 400 Remote Control

Figure 2-4 illustrates the DRC 400:

**Figure 2-4**
**DRC 400 remote control**

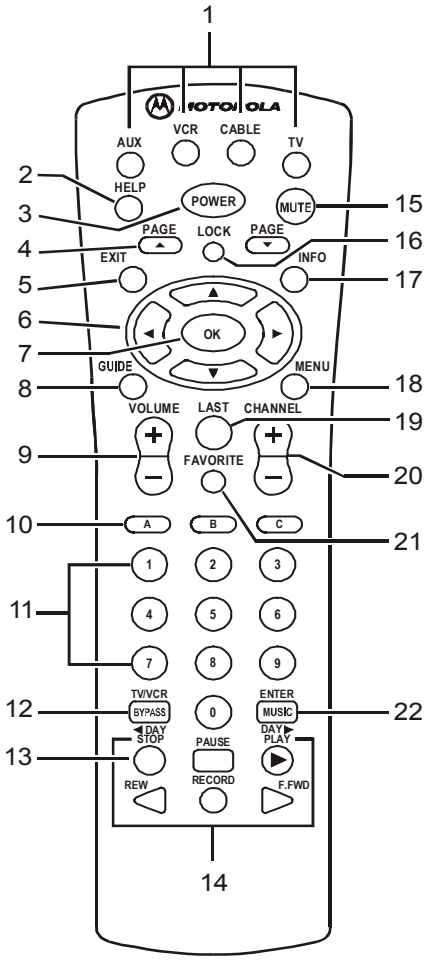
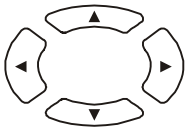


Table 2-4 describes the remote control keys:

**Table 2-4**
**Remote control keys**

| Key | Item | Description |
|---|---|---|
| 1 | **AUX, VCR, CABLE, or TV** | Selects a desired device to control. The selected mode will remain active until you press another device key. |
| 2 | **HELP** | Displays the help screen. |
| 3 | **POWER** | Turns the selected home entertainment component on or off. |
| 4 | **PAGE ▲ or PAGE▼** | Pages through menu screens and the program guide. |
| 5 | **EXIT** | Exits a menu or program guide. |
| 6 |  | Moves the cursor around the program guide and menu screens. |
| 7 | **OK/SELECT** | Selects menu options, Pay-Per-View events or tune programs from the program guide. Your remote may only have OK; this key still performs the same functions. |
| 8 | **GUIDE** | Displays the program guide. |
| 9 | **VOLUME + or VOLUME -** | Increases or decreases the volume of the currently selected device. |
| 10 | **A, B, or C** | Functionality is determined from services offered by the service provider. |
| 11 | **NUMBER KEYS** | Directly selects a channel. |
| 12 | **TV/VCR BYPASS** | Enables the RF bypass function. A cable-ready TV is required for this function to operate. |
| 13 | **◄ Day Day ►** | Moves the program guide ahead or back 24 hours. |
| 14 | **STOP, PAUSE, PLAY, REW, RECORD, F.FWD** | Controls the VCR. |
| 15 | **MUTE** | Toggles the sound on and off. |
| 16 | **LOCK/PPV** | Limits viewing of selected programs; and is used to view the Pay-Per-View menu. Your remote may have only LOCK; this key still performs the same functions. |
| 17 | **INFO** | Displays the current channel and program information (not supported by all applications). |
| 18 | **MENU** | Displays the Main menu. |
| 19 | **LAST** | Recalls the last channel or goes back one screen in the menu. |
| 20 | **CHANNEL + or -** | Changes the channels by moving up or down. |
| 21 | **FAVORITE** | Displays preset favorite cable channels. |
| 22 | **ENTER/MUSIC** | Displays digital music channel menus. On some TV models, press to enter channels. |

## Installing Batteries in Remote Control

Before using the remote control, you must install two AA (1.5 V) alkaline batteries. Figure 2-5 illustrates battery access on the back of the remote control.

To install batteries in an DRC 400:

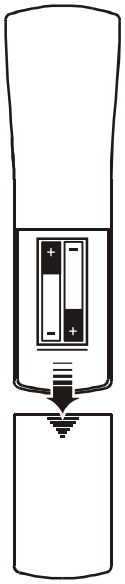
1 Press and slide the battery compartment cover off.

2 Place the batteries in the compartment; be careful to observe the correct polarity.

3 Slide the battery compartment cover back into place.

*Battery installation will vary with each style of remote control. Refer to the instructions included with your remote control for installing batteries.*

**Figure 2-5**
**Back view of remote control**



Section 3

# Installation

This section provides instructions for installing and cabling the DCT2000. To complete the installation, you must:

- Connect the cables
- Supply power to equipment
- Download configuration information and software
- Run operational check and diagnostics

## Before You Begin

Before you begin, review the installation instructions, gather the required items, and complete the tasks listed below:

- Determine if the subscriber's system requirements include an A/B In, RF Bypass, Dual A/B-RF Bypass module, or a STARFONE module. These options can be installed before leaving the office. Installation instructions are provided with these modules.
- Verify that you have 75-ohm coaxial cables with F-type connectors and RCA baseband phono-type cables.
- Determine if you are connecting the DCT2000 to a standard TV or a composite (baseband) monitor.
- Place the DCT2000 on a smooth, flat surface and remove any obstructions that could interfere with the free flow of air over, under, or around it. Advise the subscriber not to place anything on top of the unit.

## Installing the DCT2000

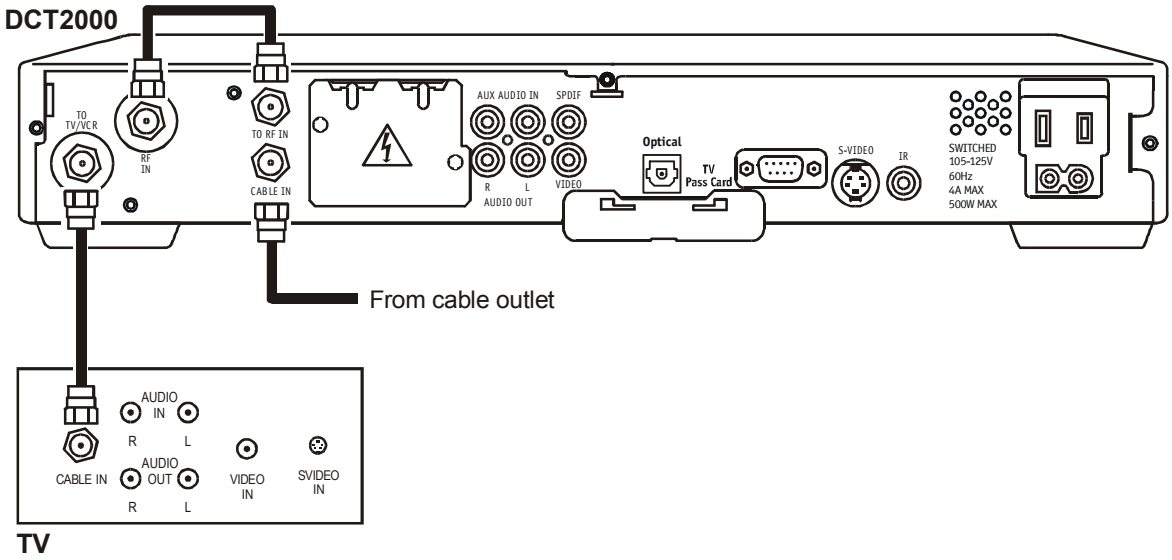
To install the DCT2000:

1. If an add-on module is required and it was not previously installed, do that now. When installed, verify that the appropriate configuration information has been downloaded via the access control system.
2. Determine if you are connecting the DCT2000 to a conventional TV or to a monitor. To install the video connection:
   - For a conventional TV, use a 75-ohm coaxial cable with F-type connectors.
   - For a monitor, use an RCA phono cable to connect the VIDEO connector to the monitor.
3. Locate the cabling diagram that matches the subscriber's configuration requirement.
4. Connect the cables as illustrated in the diagram.
5. Perform the basic operational check in this section after the DCT2000 is installed.

## Standard Cabling Diagram

The DCT2000 will output on either channel 3 or 4 depending on the configuration message from the control system. Figure 3-1 illustrates a standard diagram connecting the DCT2000 to a TV using RF connectors:

**Figure 3-1**
**Standard cabling**

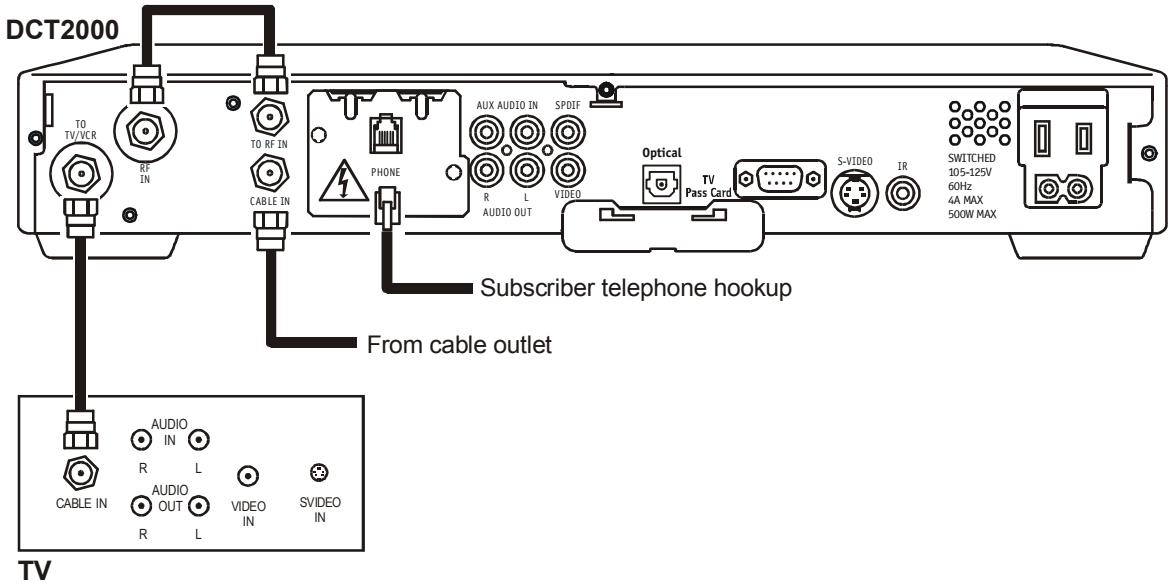



*The remodulated channel, 3 or 4, does not carry stereo for digital channels. Connect the DCT2000 using RCA baseband connectors to receive stereo on digital channels. These connections are illustrated later in this section.*

## STARFONE module cabling diagram

Figure 3-2 illustrates the RF wiring diagram for the DCT2000 when it has a telephone return modem:

**Figure 3-2**
**Standard wiring with a STARFONE module**

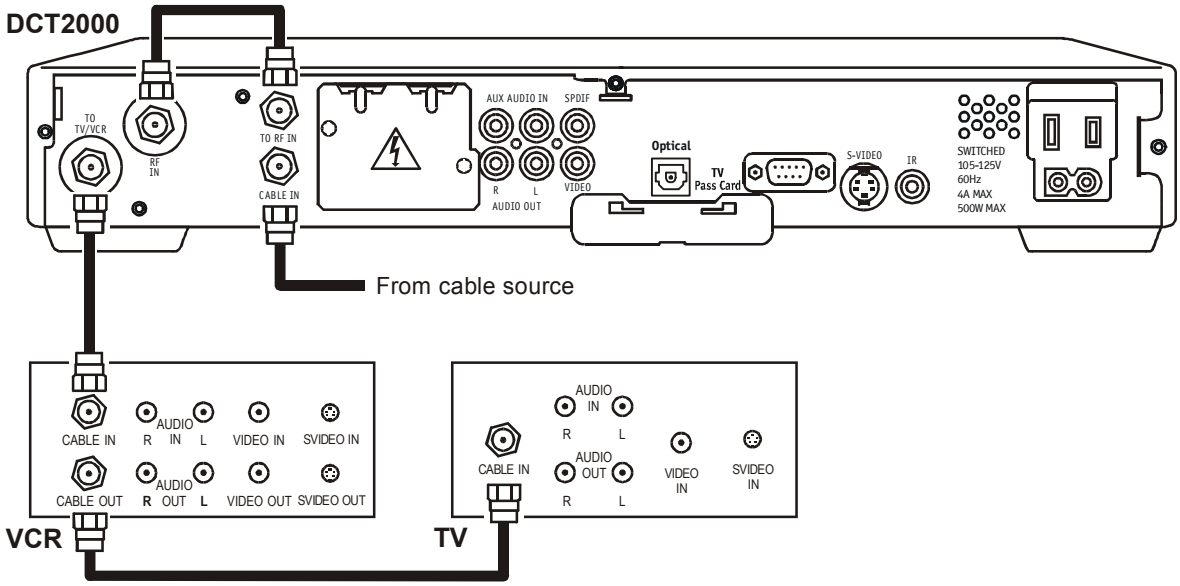



For service providers planning to implement RF return capabilities, it is recommended the DCT2000 be wired for both the STARFONE telephone return and the integrated STARVUE RF return. This enables the operator to move the DCT2000 into a two-way RF return without rewiring the DCT2000 later.

## Standard VCR Cabling Diagram

Figure 3-3 illustrates the basic cabling diagram that enables you to record the channel being viewed:

**Figure 3-3**
**Standard VCR cabling**



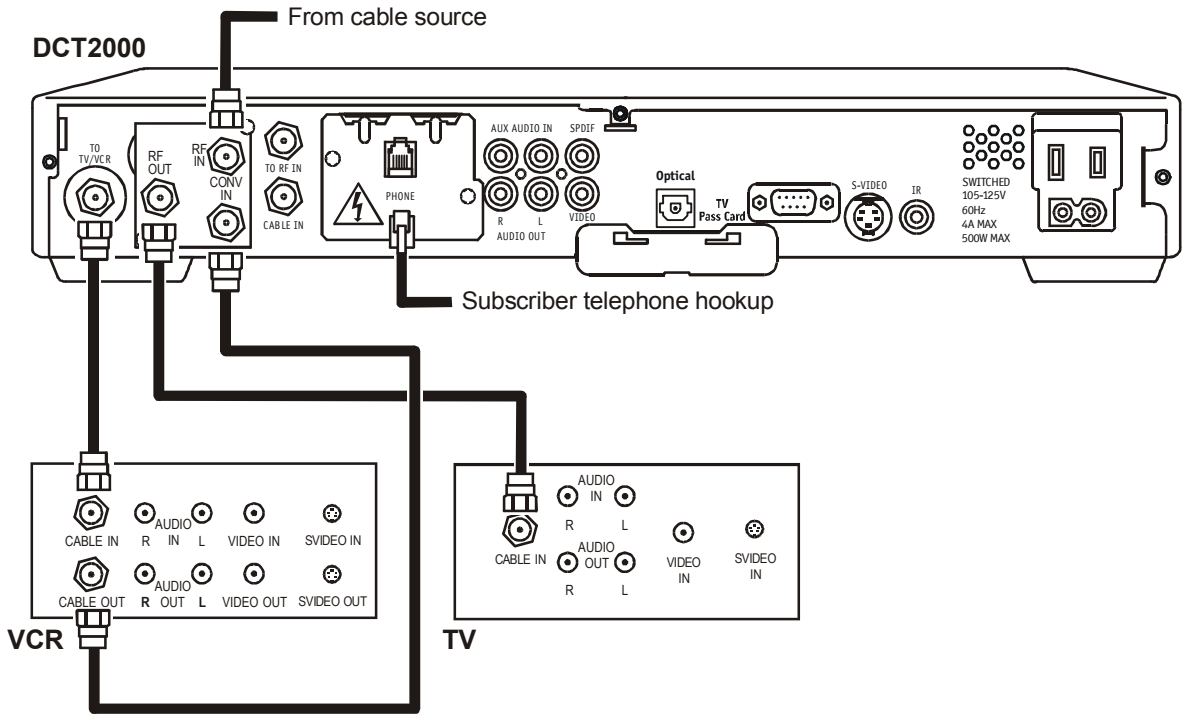

*The remodulated channel, 3 or 4 does not carry stereo for digital channels. Connect the DCT2000 using RCA baseband connectors to receive stereo on digital channels. These connections are illustrated later in this section.*

## RF Bypass Switch VCR Cabling Diagrams

Proper operation of the RF Bypass feature requires special configuration in the control system and in the EPG settings.

The STARFONE return module is used in a one-way addressable system to send information to the controller through the subscriber's telephone hookup. Figure 3-4 illustrates the cabling diagram that enables viewing an unscrambled analog channel on TV while recording another channel through the DCT2000:

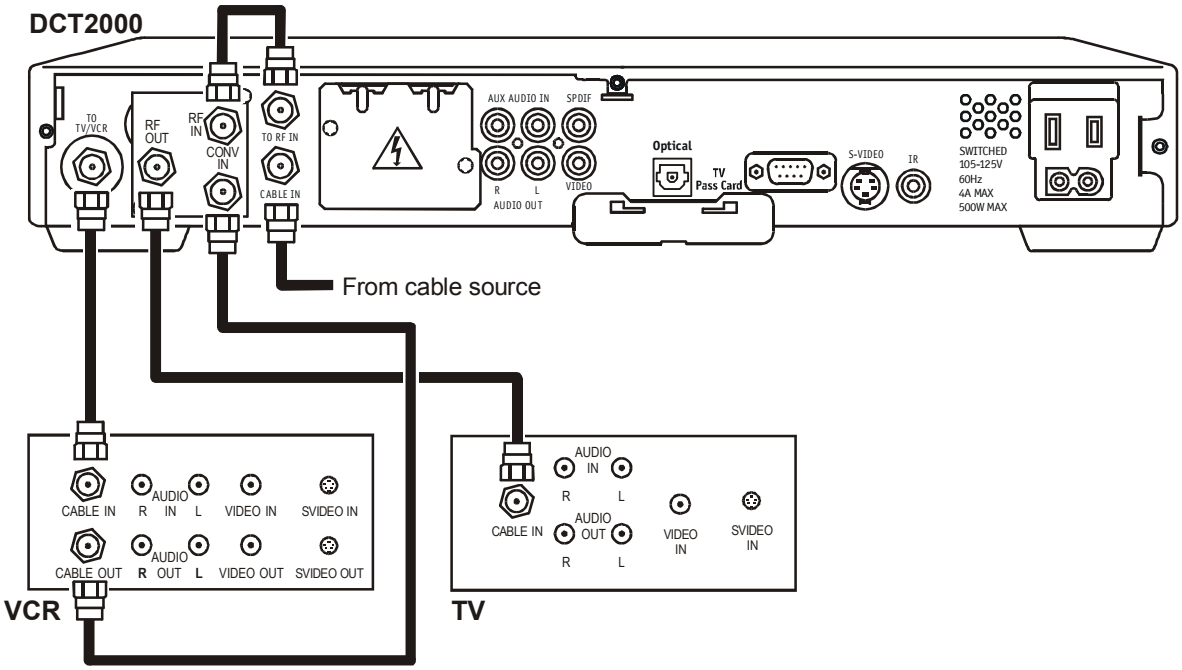
**Figure 3-4**
**RF Bypass switch with VCR (STARFONE return module installed)**




If the operator plans to implement two-way RF return functionality in the future, the installer should use the integrated STARVUE RF return.

Figure 3-5 illustrates the cabling diagram that uses the RF return and enables viewing of an unscrambled analog channel on TV while recording another channel through the DCT2000:

**Figure 3-5**
**Cabling with RF Bypass module (using RF return)**



## A/B In Module Cabling Diagrams

The A/B In module is commonly used in dual-cable systems. Figure 3-6 illustrates a DCT2000 that is equipped with a STARFONE module:

**Figure 3-6**
**A/B In module with a STARFONE module**

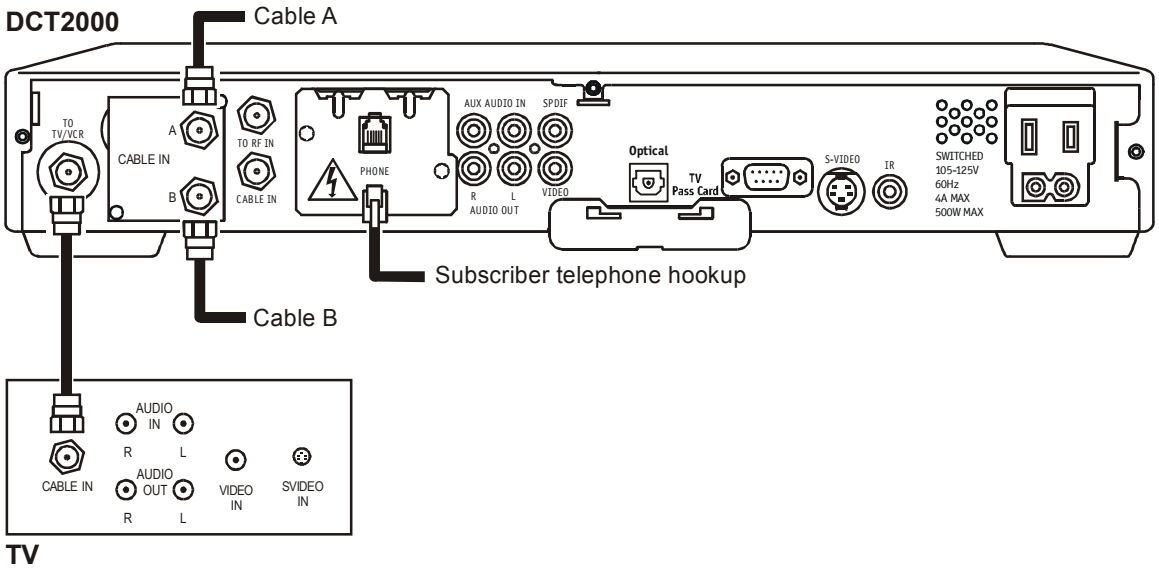



Figure 3-7 illustrates a DCT2000 with the return on Cable A:

**Figure 3-7**
**A/B In module with return on Cable A**

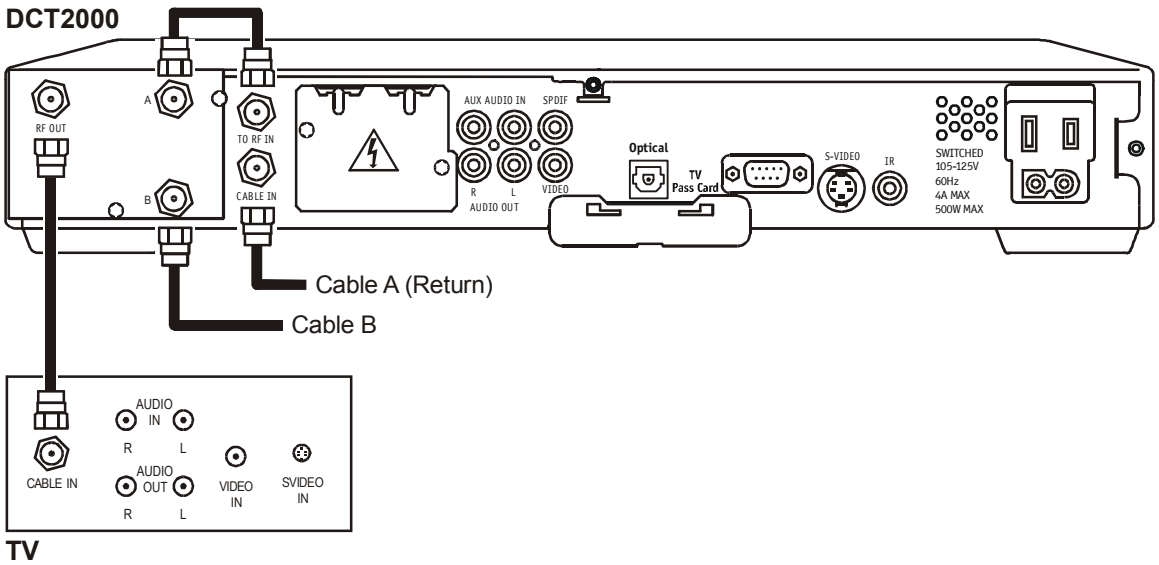
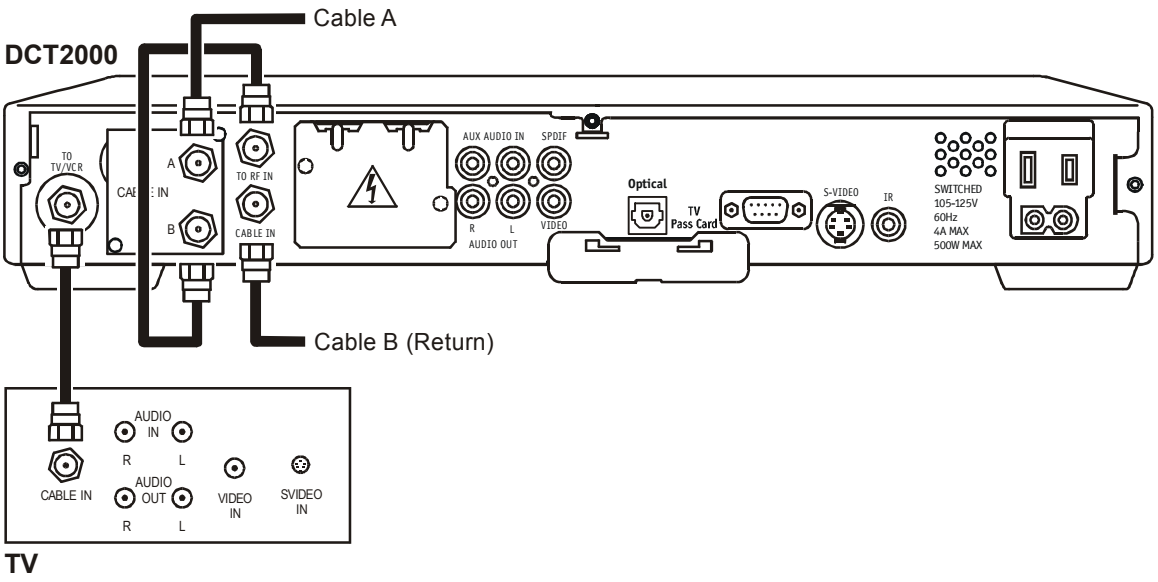


Figure 3-8 illustrates a DCT2000 when the return is on Cable B:

**Figure 3-8**
**A/B In module with return on Cable B**



## Dual A/B-RF Bypass Module Cabling Diagrams

The Dual A/B-RF Bypass module is commonly used in dual-cable systems. Both Cable A and Cable B are cable signals coming from the service provider. The service provider determines which source will be the return cable. Choose the cabling diagram that matches the return configuration you need.

The Dual A/B cable system using a STARFONE module utilizes the telephone modem as the return path to the service provider. Figure 3-9 illustrates a DCT2000 with a STARFONE module:

**Figure 3-9**
**Return on STARFONE module**

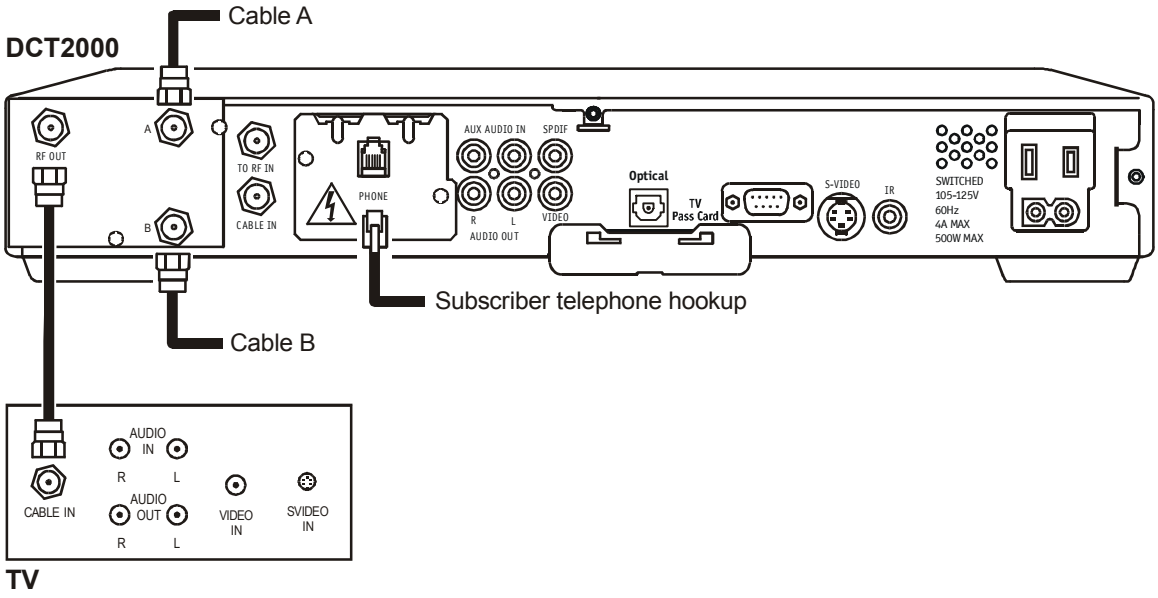


Figure 3-10 illustrates a DCT2000 with the Dual A/B RF Bypass module when the return is on Cable A:

**Figure 3-10**
**Return on Cable A**

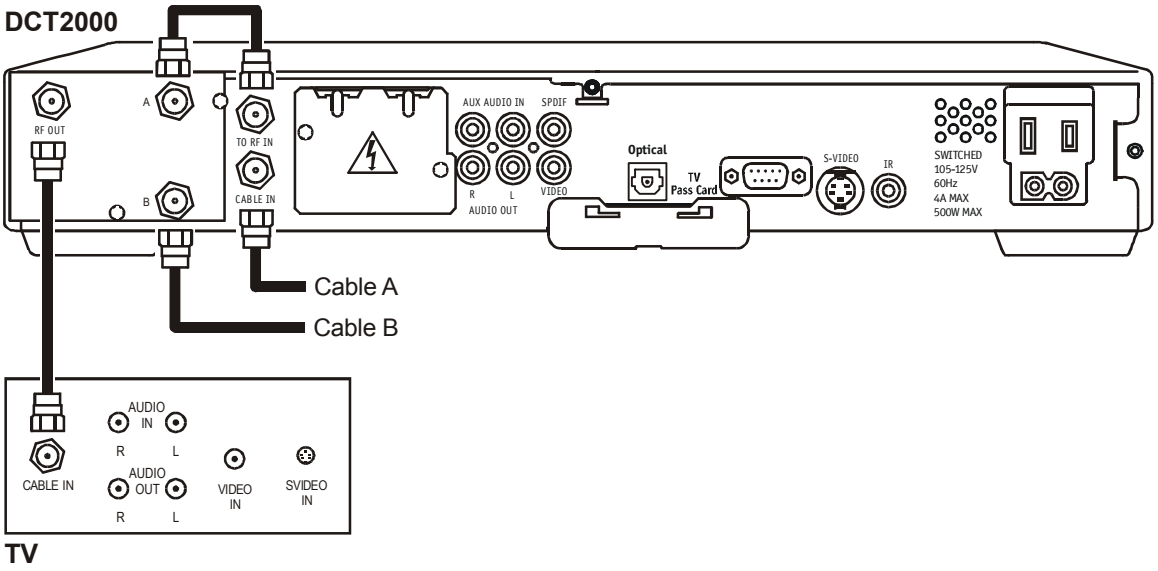
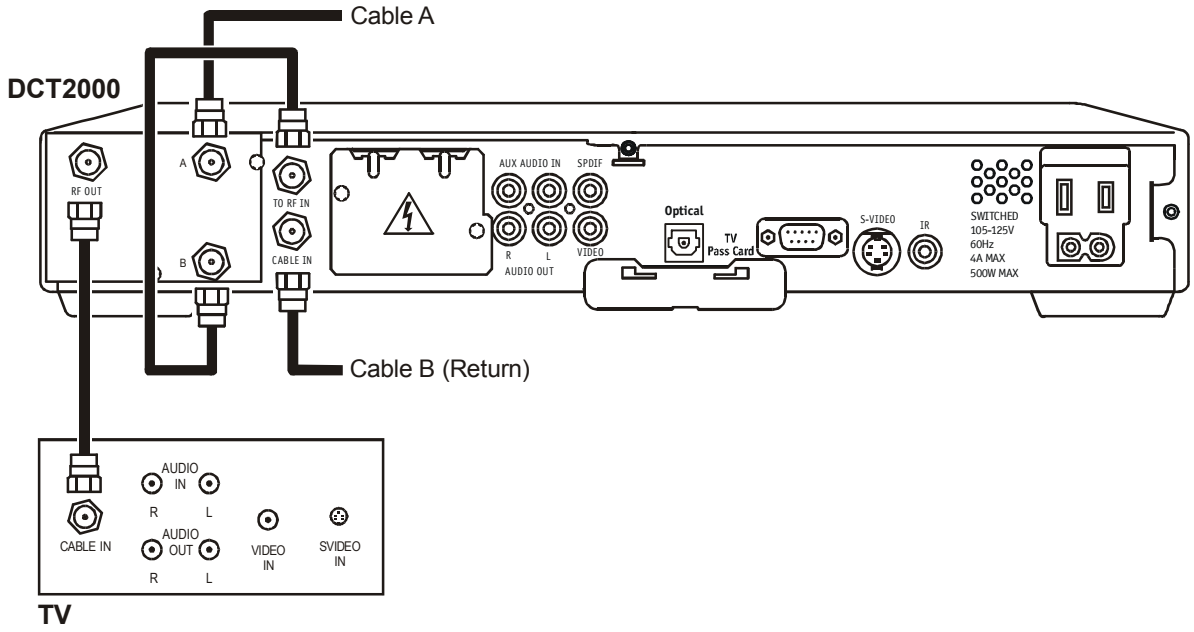



Figure 3-11 illustrates a DCT2000 with a Dual A/B RF Bypass module when the return is on Cable B:

**Figure 3-11**
**Return on Cable B**

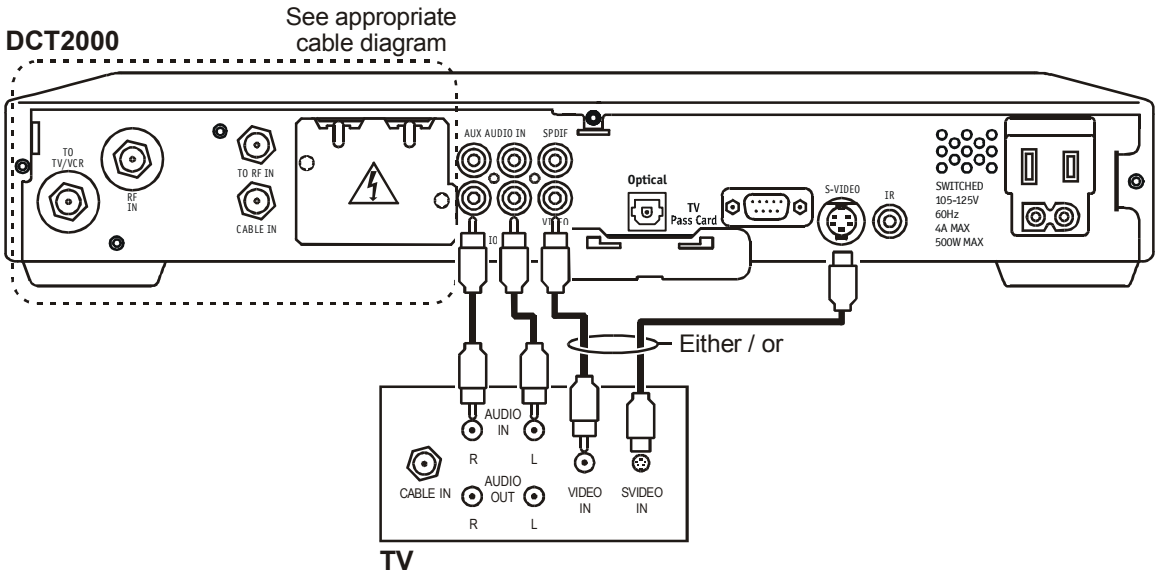


## Composite Baseband and S-Video Cabling Diagrams

Connecting the DCT2000 using the baseband RCA type outputs enables the subscriber to experience stereo and Dolby Surround® sound on digital channels when available.

Figure 3-12 illustrates the standard baseband audio and video outputs of the DCT2000:

**Figure 3-12**
**Standard baseband cabling**

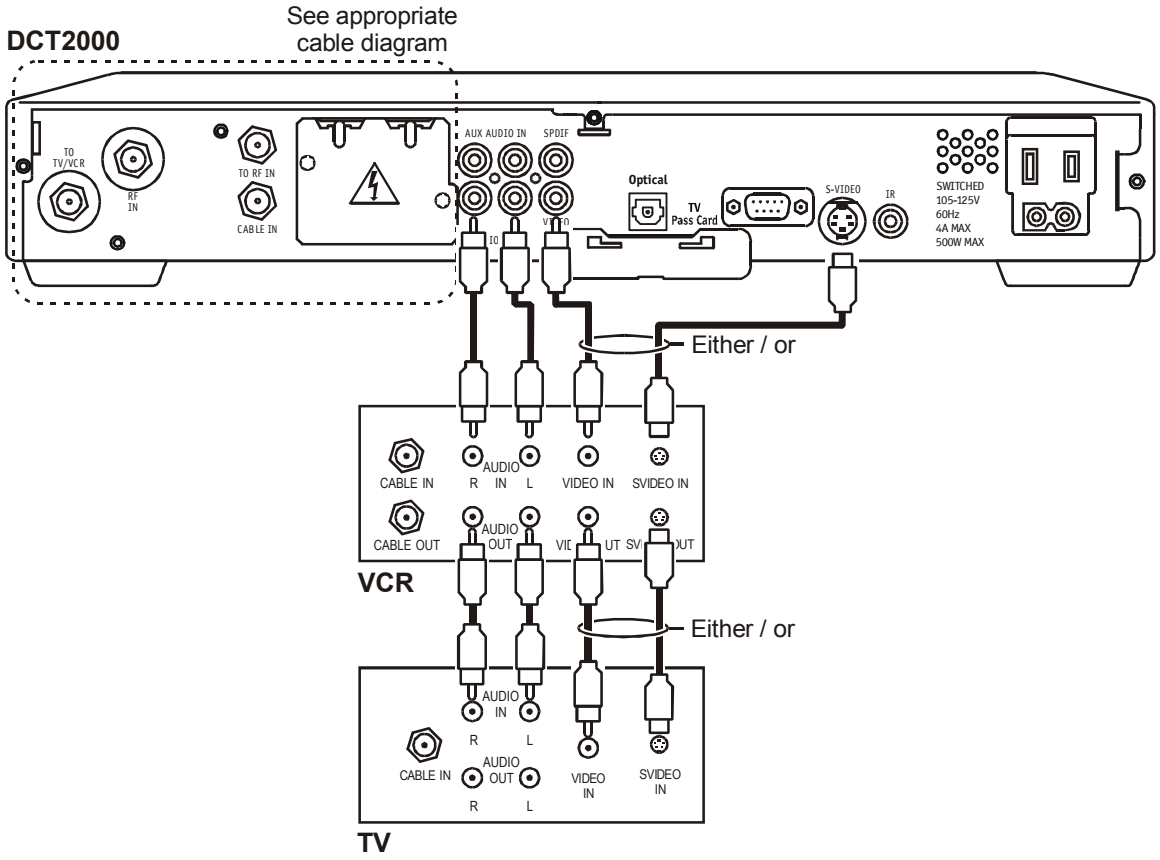



The S-Video connector is part of the Home Theatre option and is not included on all DCT2000s.

*When connecting the video path, connect either the baseband composite video or S-video to the input device you plan to use. Do not connect both the baseband composite video and S-video. Certain types of electronics equipment will not support both video inputs simultaneously.*

Figure 3-13 illustrates the baseband audio and video outputs of the DCT2000 that are available to connect to a VCR:

**Figure 3-13**
**Composite VCR cabling**

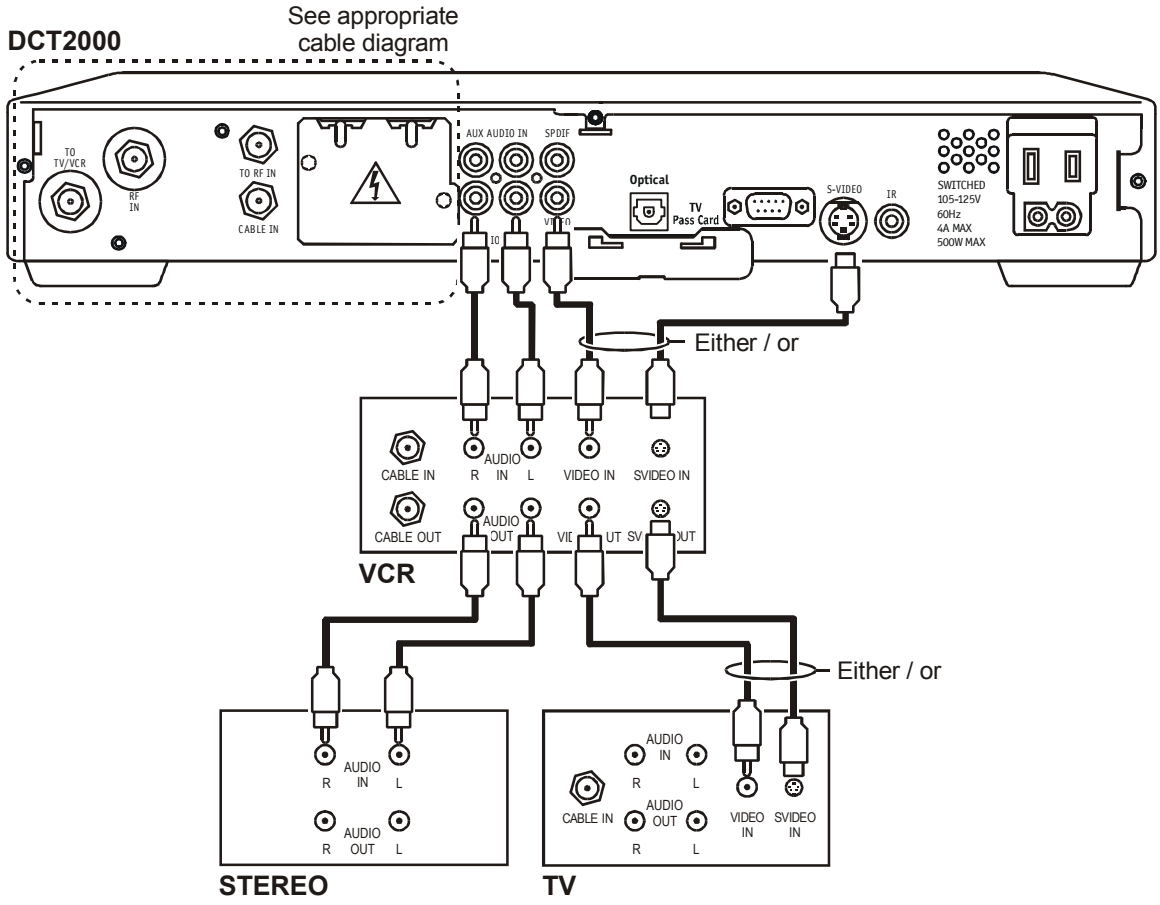



*When connecting the video path, connect either the baseband composite video or S-video to the input device you plan to use. Do not connect both the baseband composite video and S-video. Certain types of electronics equipment will not support both video inputs simultaneously.*

## Stereo Cabling Diagram (Baseband)

This audio configuration does not provide for a TV playing through the stereo. Figure 3-14 illustrates how to connect the DCT2000 to a stereo using the audio connectors on the VCR:

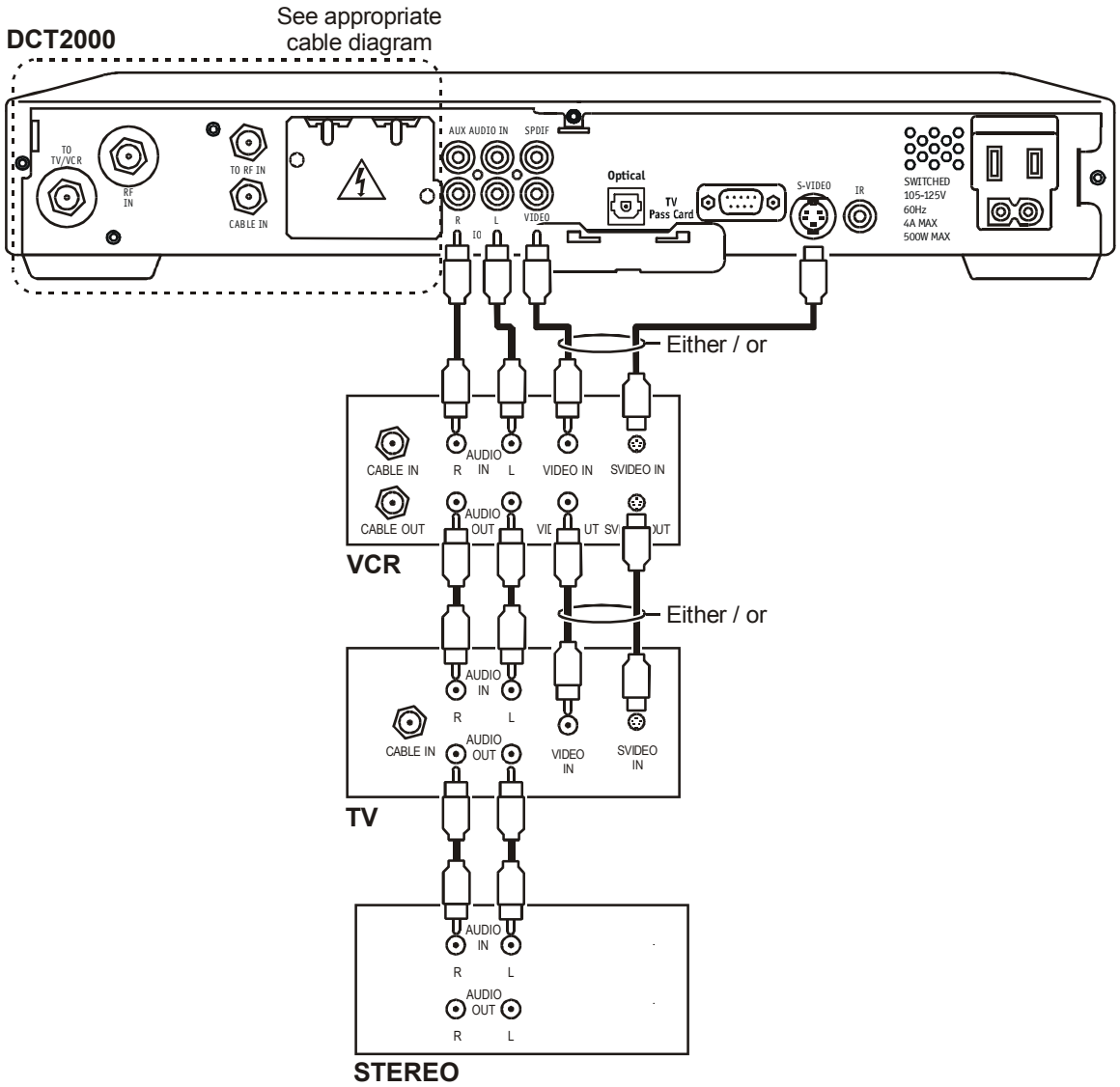
**Figure 3-14**
**Audio on the VCR**




*When connecting the video path, connect either the baseband composite video or S-video to the input device you plan to use. Do not connect both the baseband composite video and S-video. Certain types of electronics equipment will not support both video inputs simultaneously.*

This audio configuration enables the TV to play through the stereo. Figure 3-15 shows how to connect the DCT2000 to a stereo using the audio loop-through connectors on the VCR and the audio output ports on the TV monitor:

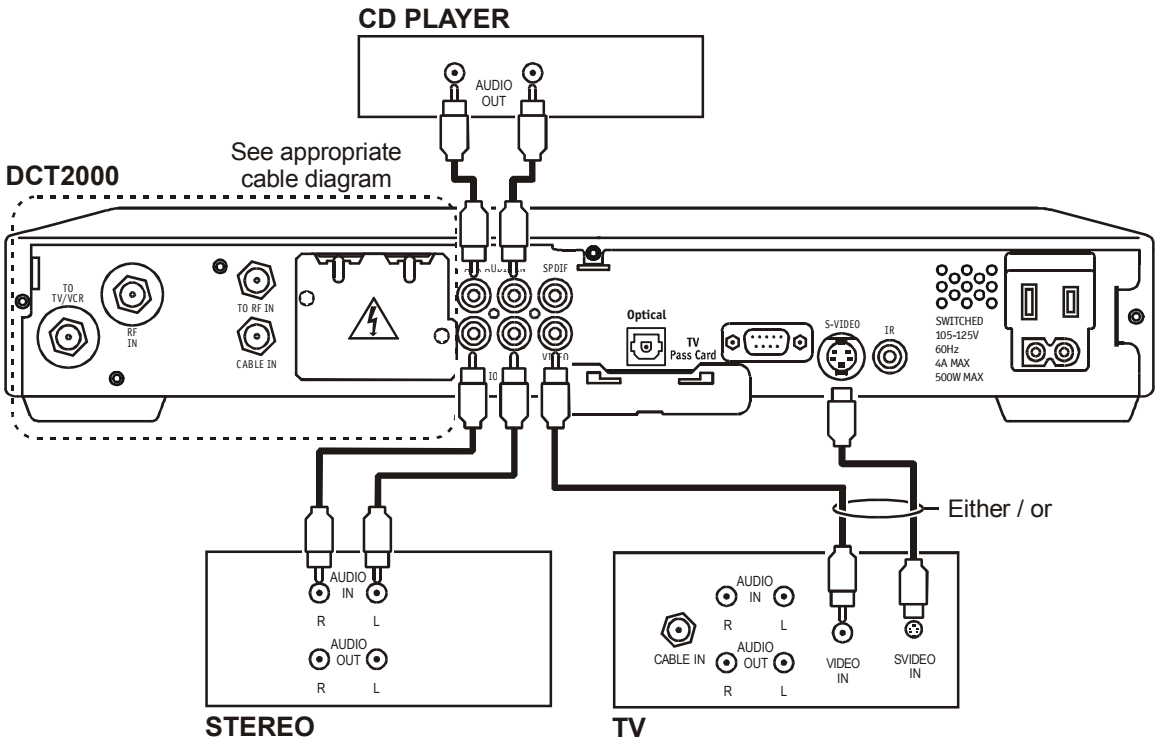
**Figure 3-15**
**Audio on VCR/audio output on TV**




*When connecting the video path, connect either the baseband composite video or S-video to the input device you plan to use. Do not connect both the baseband composite video and S-video. Certain types of electronics equipment will not support both video inputs simultaneously.*

When all of the RCA audio connectors on the back of the stereo receiver are used, the DCT2000 enables audio to pass through an external device such as a CD player. In this configuration, a subscriber's CD player can be played through the DCT2000 to a stereo receiver. Figure 3-16 illustrates how to connect the RCA baseband auxiliary audio input/output on the DCT2000:

**Figure 3-16**
**CD player cabling**




The DCT2000 must be turned off from the front panel to enable audio loop-through signals to pass through. When the DCT2000 is powered on, the audio outputs correspond with the currently tuned channel on the DCT2000.

## Dolby Digital Cabling Diagrams

The DCT2000 can deliver Dolby AC-3 audio to a Dolby Digital stereo receiver using the SPDIF RCA or optical cable with a TOSLINK connector. Because the SPDIF does not carry audio for analog channels, use both the baseband L/R audio and the SPDIF connectors when connecting the DCT2000 to a digital receiver. The optical connector carries Dolby digital for both analog and digital channels.

PCM audio and AC-3 are the operation modes for the SPDIF connector. PCM audio mode is the default setting from the factory. Use the Electronic Program Guide (EPG) to select an alternative operating mode for the DCT2000. If the EPG does not provide a PCM or AC-3 option, then the SPDIF port will default to PCM audio.

Table 3-1 describes the functionality of the audio ports based on the digital audio mode selected:

**Table 3-1**
**Audio port functionality**

| | Audio Mode (selected in application setup screen) | |
|---|---|---|
| | **PCM** | **Dolby Digital** |
| **Baseband Audio Left/Right** | **Analog channels**: Passthrough of transmitted signal (mono, stereo, or Dolby Surround). | **Analog channels**: Passthrough of transmitted signal (mono, stereo, or Dolby Surround). |
| | **Digital channels**: Mono, stereo, or Dolby Surround down mix of Dolby Digital as selected by user. Default is stereo. | **Digital channels (option L)**: Mono, stereo, or Dolby Surround down mix of Dolby Digital as selected by user. Default is stereo. |
| | | **Digital Channels (option K)**: No output. |
| | | **Digital channels (not option K or L)**: Mono, stereo, or Dolby Surround down mix of Dolby Digital as selected by user. Default is stereo. |
| **SPDIF – Option K** | **Analog channels**: No output. | **Analog channels**: No output. |
| | **Digital channels**: Mono, stereo, or Dolby Surround down mix of Dolby Digital as selected by user. Default is stereo. | **Digital channels**: Dolby Digital. |
| **Coax/Optical – Option L** | **Analog channels**: Passthrough of transmitted signal (mono, stereo, or Dolby Surround) in PCM format. | **Analog channels**: Passthrough of transmitted signal (mono, stereo, or Dolby Surround) in PCM format. |
| | **Digital channels**: Mono, stereo, or Dolby Surround down mix of Dolby Digital as selected by user. In PCM format. | **Digital channels**: Dolby Digital. |

For normal viewing with the SPDIF connection:

1. Set the DCT2000 to PCM audio mode using the Electronic Program Guide.
2. Adjust the Dolby Digital receiver input audio settings for the DCT2000 to baseband L/R inputs (refer to stereo receiver instructions for more information). This prevents audio loss while channel surfing through analog channels.
3. When a digital program has been selected for viewing, set the DCT2000 to AC-3 mode using the EPG. Set the stereo receiver to digital audio input to experience AC-3 audio.

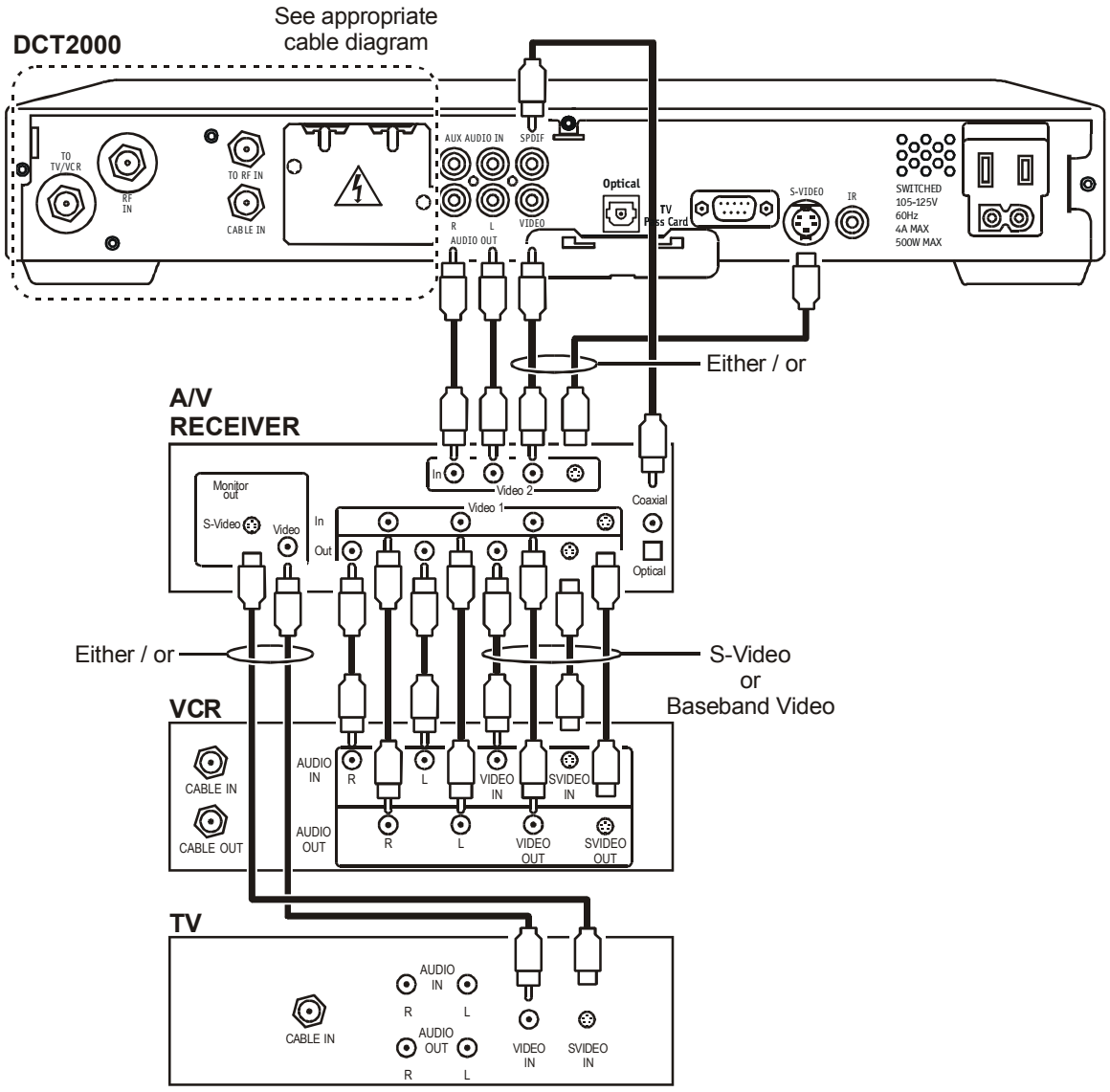
Many Dolby Digital receivers are designed with A/V output ports that feed external devices such as a VCR. The AV output content is based on the selected input device. When the DCT2000 is selected as the input device for VCR recording, an alternate device cannot simultaneously use the Dolby Digital receiver, or the VCR will then record the secondary device. (Reference the Dolby Digital receiver installation manual for information on selecting and configuring A/V interfaces on the receiver).

For normal viewing with the optical connector set the audio in the EPG to:

- Mono for one channel
- Stereo for two channels
- Matrix stereo for 5.1 (digital AC-3)

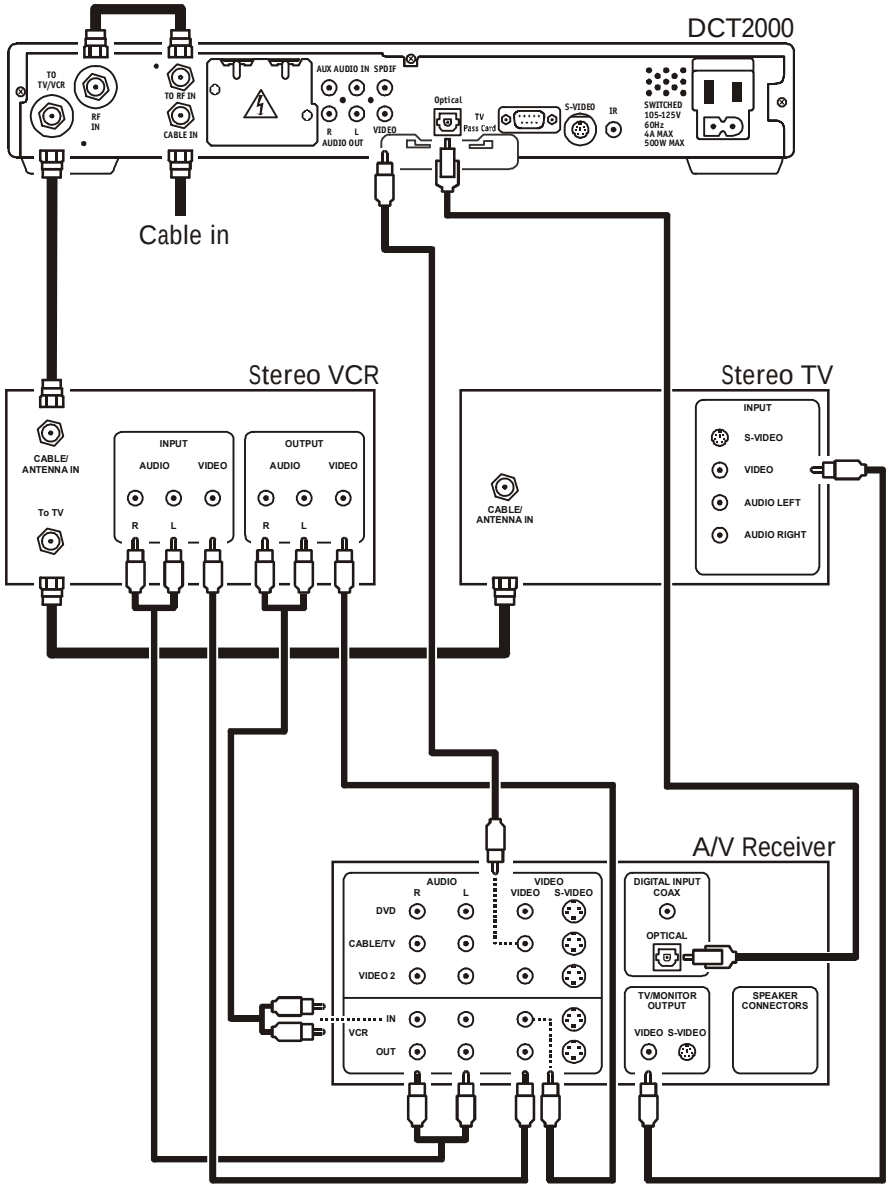
Using this configuration the audio/video signals are passed through the digital receiver to enable the VCR record and playback features. Figure 3-17 illustrates audio/video connections for a Dolby Digital receiver:

**Figure 3-17**
**Audio through A/V Receiver**



When using the Dolby® 5.1 optical output, the SPDIF and left/right baseband audio connections to the A/V receiver are not used. Figure 3-18 illustrates the Dolby 5.1 optical output connections:

**Figure 3-18**
**Dolby 5.1 optical output**



## Operational Check

The operational check tests the communication link between the remote control and the DCT2000. The procedures verify the DCT2000 response to remote control commands. Table 3-2 lists the operational check procedures:

**Table 3-2**
**Operational check**

| Feature | Testing Procedure |
|---|---|
| **Power on** | ▪ Press POWER to turn on the DCT2000.<br>▪ Turn on the TV and tune it to the output channel of the DCT2000 (channel 3 or 4). |
| **Channel Selection** | ▪ Scan through the channels using the CHANNEL ▲ ▼ keys on the DCT2000 and the CHANNEL + - keys on the remote control.<br>▪ Tune to several channels by entering the channel number with the numeric keys on the remote control. |
| **Volume Control** | ▪ Use the TV volume control to adjust the sound volume to a moderate level.<br>▪ Press VOLUME + - on the remote control to increase the volume to its upper limit, lowest level, and to a comfortable level.<br>▪ Press MUTE to turn the sound completely off. Press MUTE again to restore the sound. |

If the DCT2000 does not operate properly, refer to Section 5, "Troubleshooting."

Section 4

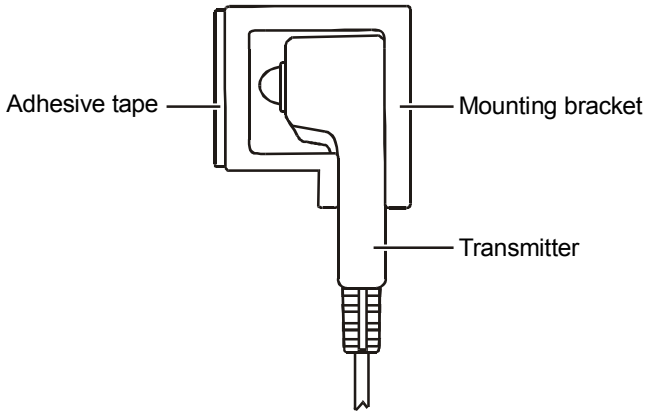
# Adding the IR Blaster Option

The IR Blaster provides control of the subscriber's VCR from the DCT2000. It consists of a low-power infrared transmitter attached to a six-foot cord and a mounting bracket. The mounting bracket is a clear plastic holder with a pad of adhesive tape for installing the IR Blaster near the VCR IR receiver. A mini-pin connector at the end of the cord connects the IR Blaster to the DCT2000.

*The IR Blaster functionality is controlled by the interactive program application that is resident on the DCT2000. Not all applications support the optional IR Blaster.*

Figure 4-1 illustrates the IR transmitter installed in the mounting bracket:

**Figure 4-1**
**IR transmitter installed in mounting bracket**




The IR Blaster is automatically activated through the electronic program guide. Individual VCR codes are broadcast through the out-of-band data channel and are updated periodically as new codes are added.

The procedure for installing the IR Blaster is described in the following paragraphs.

## Locating the IR Receiver on the VCR

The IR receiver is not visible on some VCRs. You can locate the receiver using the following procedure:

1. Obtain a piece of opaque material, such as a 3- by 5-inch index card.
2. Use the card to block areas of the VCR where the receiver might be located. Turn the VCR on and off, while pointing the remote control at the card blocking the VCR. Be sure the remote control is close to the VCR to reduce reflections the receiver may pick up.
3. Note the area where the VCR is unresponsive to the remote control. This region contains the receiver and can be marked by loosely taping the index card to the area.

Because the IR Blaster radiates an area approximately 40 degrees wide, it is not necessary to be precisely on target with the remote control. Offset the location of the IR Blaster transmitters from the VCR receiver to reduce interference with operation of the VCR remote control.

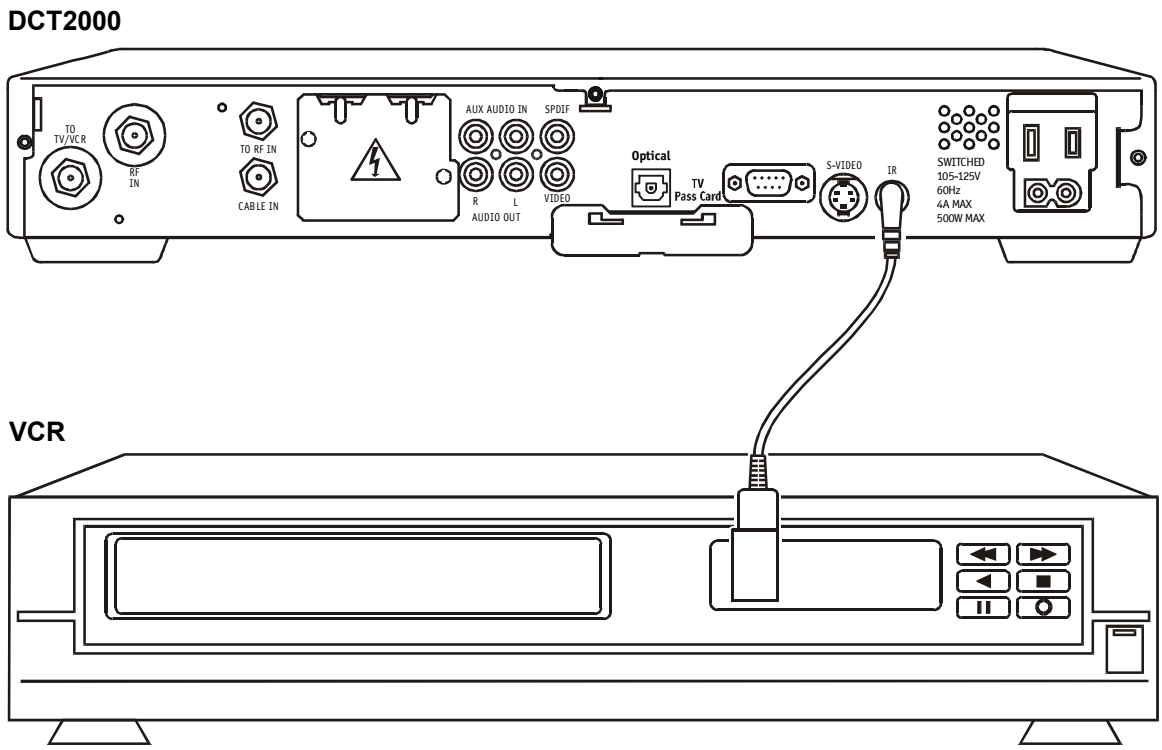
## Installing the IR Blaster

To install the IR Blaster:

1 Fit the transmitter into the mounting bracket (refer to Figure 4-1).

2 Plug the mini-pin connector into the IR jack on the rear panel of the DCT2000 rear panel (refer to Figure 4-2).

**Figure 4-2**
**IR Blaster installed**




3 Remove the adhesive tape cover from the mounting bracket.

4 Position the IR receiver off center of the VCR receiver and then press firmly attaching the mounting bracket on the VCR. Be careful to route the wire so that it does not prevent loading videotapes.

## Checking the Installation

The IR Blaster is now located near the receiver and the VCR can be controlled through the DCT2000. As a final check, operate the VCR using the remote control from various positions in the room. If the IR Blaster is obstructing the IR receiver on the VCR, move it slightly.

Section 5

# Troubleshooting

This section provides information to assist you in quickly detecting, isolating, and resolving error conditions that might occur when using the DCT2000. If you need assistance, call TRC:

- Inside the U.S.: 1-888-944-HELP (1-888-944-4357)
- Outside the U.S.: 215-323-0044

Table 5-1 is a list of possible problems and solutions:

**Table 5-1**
**Troubleshooting guidelines**

| Problem | Possible Solution |
|---|---|
| **No power to the DCT2000** | Check the power outlet for AC power. |
| | Be sure the TV is tuned to the output channel of the DCT2000 (channel 3 or 4). |
| | Verify that cable connections are correct from the TV set or monitor to the DCT2000. |
| | Check that the power cord is properly plugged into the outlet and DCT2000. |
| **Remote control is not responding** | Check for an obstruction between the remote control and the DCT2000. Aim the remote control directly at the DCT2000, not the TV or VCR. |
| | Be sure you firmly and deliberately press and release operation keys one at a time. |
| | Verify that channels can be changed using the keys on the front panel and then check that the batteries have been installed properly. Replace with new batteries if necessary. |
| | Check that the DCT2000 has been initialized correctly; refer to Diagnostics. |
| **The DCT2000 is not receiving a cable signal** | Check the cable connections and hand-tighten if necessary. |
| | Verify that the cable connections are correct. |
| | Verify the TV is working and has a clear picture. |
| **Guide has no data** | Unplug the power to the DCT2000 and plug in the unit again. Wait for the DCT2000 to collect the data. |
| **VCR did not record** | Turn the VCR off when you are not using it. |
| | Be sure the IR Blaster is correctly placed. |
| | Check the Scheduled Events list to be sure programs are scheduled for recording. |

Appendix A

# Specifications

| | |
|---|---|
| **Input frequency** | 54 through 860 MHz (excluding data carrier frequency) |
| **HRC/IRC frequency assignments** | Downloadable |
| **Number of channels:** | 136 carriers per cable, 1 or 2 cables |
| **Analog** | 1 channel per carrier |
| **Digital** | More than 1 channel per carrier, content dependent |
| **Dual A/B cable switching** | Optional A/B (field upgradeable) |
| **Input analog video level** | 0 dBmV through +15 dBmV |
| **Input analog sound level** | –17 dBmV through +2 dBmV |
| **Average digital input level** | –10 dBmV through +5 dBmV |
| **Data carrier:** | QPSK-modulated carrier |
| **Frequency** | 75.250 MHz or 72.75 MHz or 104.2 MHz |
| **Bandwidth** | 1.5 MHz |
| **Level** | –10 dBmV through +5 dBmV |
| **Video s/n** | 49 dB @ 0 dBmV input level |
| **Output frequency accuracy** | ±150 kHz |
| **Return loss:** | |
| **Input** | 6 dB minimum |
| **Output** | 8 dB minimum |
| **Spurious output** | –57 dBc maximum, in band |
| **Cross-modulation distortion** | –56 dB (136 channels, each @ +15 dBmV) |
| **Composite second order distortion** | –57 dB (136 channels, each @ +15 dBmV) |
| **Second order distortion** | –60 dB (136 channels, each @ +15 dBmV) |
| **Composite triple beat distortion** | –57 dB (136 channels, each @ +15 dBmV) |
| **Set-top input beats (with all input signals)** | –25 dB (136 channels, each @ +15 dBmV) |
| **Hum modulation distortion** | 3 IRE |
| **Output level** | 10 through 15 dBmV |
| **Isolation (input/output)** | 70 dB minimum |
| **Differential phase** | 10 degrees (maximum) |
| **Analog descrambling method (optional)** | Gated sync suppression or dynamic gated sync suppression, video inversion, audio privacy, and Hamlin compatibility |
| **On-screen display (OSD):** | |
| **Screen size** | 352 x 480 pixels (configuration dependent) |
| **Message/barker capacity** | Up to 40 pages (configuration dependent) |
| **Mechanical security** | Standard: security screws, unichassis construction |

| | |
|---|---|
| **Operating environment range:** | |
| **Temperature** | 0° through 40°C (32° through 104°F) |
| **Humidity** | 5 through 95% (noncondensing) |
| **ac voltage** | 105 through 125, 60 Hz |
| **Power dissipation** | 35 W at 115 Vac |
| **Surge protection** | Provided on power supply and RF ports |
| **Size** | 17.13 × 13.25 × 2.75 inches |
| **Weight** | 8.6 pounds |

Appendix B

# Diagnostics

This section describes the diagnostics designed to confirm proper installation of the DCT2000. The diagnostics include checking error states and signal integrity, as well as provisions to identify the DCT2000 on the network and to verify communications with the headend. The diagnostic information is displayed on the front-panel LED and the On-Screen-Display.

For diagnostics provided in this appendix:

- All indicators are in decimal notation unless otherwise noted.
- All signal-level and quality indicators are based on a 0 to 100% scale, unless otherwise noted.
- All screens self-refresh at a minimum rate of once every five seconds.
- All sample displays are illustrative; actual data will differ from the examples.
- The diagnostic screens are available for DCT 7.54 code and beyond. Previous versions of DCT code are subsets.

*For diagnostics information on other DCT models, reference the installation manual for each model.*

## Accessing Diagnostics

When accessing the DCT2000 diagnostic mode the following commands are helpful:

1. Press **POWER** to turn on the DCT2000
2. Wait five seconds and then press **POWER** again to turn off the DCT2000
3. Press **SELECT** within two seconds after powering off. The DIAGNOSTICS Main menu (Figure B-1) is displayed on the OSD and `d 01` is displayed on the front-panel LED. The DCT2000 is now in diagnostic mode.
4. Use the CHANNEL keys to select the desired diagnostic.
5. Press CURSOR <, CURSOR >, SELECT, or ENTER to execute the selected diagnostic.
6. To exit the diagnostic mode, press **POWER**. The DCT2000 exits the diagnostic mode and powers off.

## Navigating the Diagnostics

Figure B-1 illustrates the OSD Diagnostics main menu:

**Figure B-1**
**Diagnostics main menu – OSD**

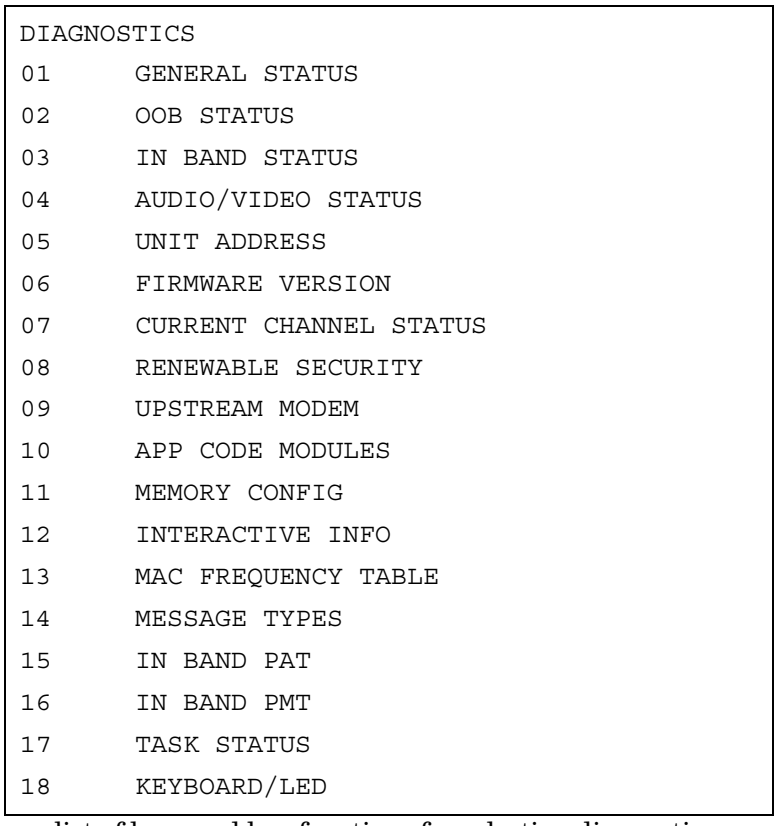



Table B-1 provides a list of keys and key functions for selecting diagnostics:

**Table B-1**
**Operational keys using the diagnostics main menu or submenus**

| Key | Key function using the diagnostics main menu | Key function using a diagnostic |
|---|---|---|
| **POWER** | DCT2000 exits the diagnostic mode and enters the OFF state | DCT2000 exits the diagnostic mode and enters the Off state |
| **CH/CUR +, CURSOR UP** | Moves the cursor up | Displays the DIAGNOSTICS Main menu |
| **CH/CUR - , CURSOR DOWN** | Moves the cursor down | Displays the DIAGNOSTICS Main menu |

| Key | Key function using the diagnostics main menu | Key function using a diagnostic |
|---|---|---|
| **CURSOR RIGHT, CURSOR LEFT, SELECT, ENTER** | The DCT2000 executes the selected diagnostic | Displays the DIAGNOSTICS Main menu |
| **GUIDE** | No function | No function |
| **MENU** | No function | No function |
| **INFO** | No function | No function |

Table B-2 lists the LED and provides a description of each diagnostic. It also indicates whether the diagnostic provides information on the LED/OSD:

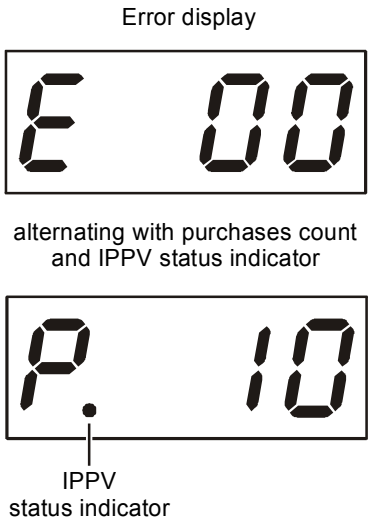
**Table B-2**
**Diagnostic**

| LED | Diagnostic | LED | OSD |
|---|---|---|---|
| **d 01** | General status of the DCT2000 | X | X |
| **d 02** | QPSK out-of-band control channel | X | X |
| **d 03** | In-band receiver status | X | X |
| **d 04** | Audio/Video status | | X |
| **d 05** | Unit address | X | X |
| **d 06** | Firmware version | X | X |
| **d 07** | Current channel status | X | X |
| **d 08** | Renewable security system | X | X |
| **d 09** | Upstream modem status | X | X |
| **d 10** | Application code modules | X | X |
| **d 11** | Memory configuration | | X |
| **d 12** | Interactive info | | X |
| **d-13** | MAC frequency table | | X |
| **d 14** | Message types | | X |
| **d 15** | In Band PAT | | X |
| **d 16** | In Band PMT | | X |
| **d 17** | Task Status | | X |
| **d 18** | Keyboard and LED diagnostic | X | X |

## d 01: DCT2000 General Status

This diagnostic indicates the general status of the DCT2000. Figure B-2 illustrates the LED that alternates between the error code and the purchases count:

**Figure B-2**
**DCT2000 General Status – LED**




The purchases count is used by Customer Service Representatives (CSRs) to check returned DCT2000 for uncollected purchases that are used to close out a subscriber's account. The largest error code takes priority.

Figure B-3 illustrates the DCT2000 Status OSD, which displays the error code, a short description of the error, the purchases count, and specific model information:

**Figure B-3**
**DCT2000 Status – OSD**

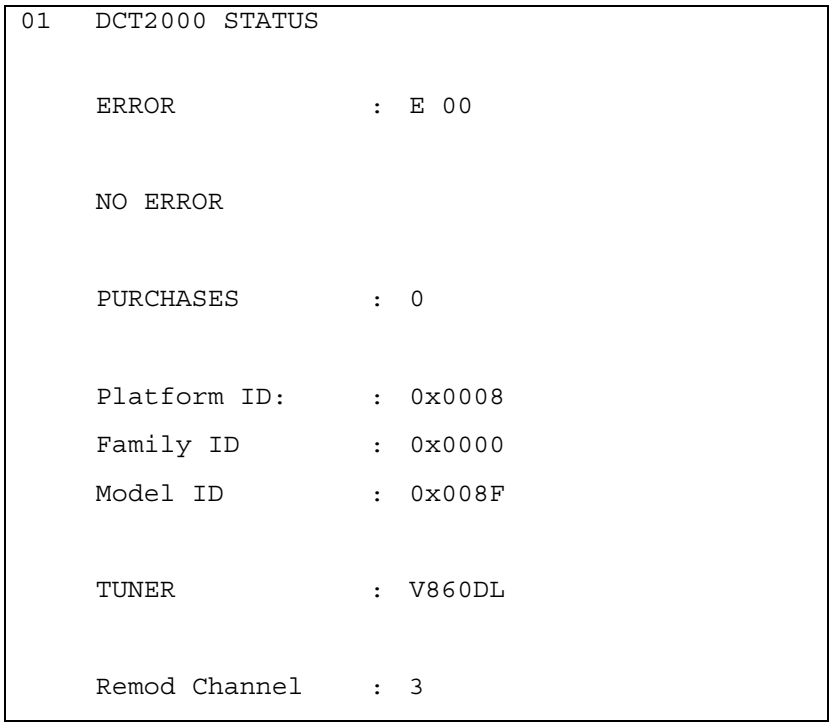



Table B-3 lists error codes:

**Table B-3**
**Error codes**

**Initialization status errors**

| Error Code | OSD | Cause | Remedy |
|---|---|---|---|
| **E 00*** | NO ERROR | Indicates normal condition after initialization | Not applicable |
| **E 01*** | NOT CONNECTED | DCT2000 did not receive a connect message | Restore out-of-band signal<br>Send a connect message |
| **E 02** | PWR CYCLE | Init Error | Box needs a Power Cycle to recover |
| **E 03** | DRAM | DRAM error | Not used at this time |
| **E 04** | DPSRAM | DP-SRAM error | Not used at this time |
| **E 07** | ROM | ROM verification failure | Power cycle box; if repetitive, return for repair |
| **E 08** | RAM | Faulty RAM, ROM, EEPROM, or POST failure (this is a hardware failure) | Return DCT2000 for repair |

| Error Code | OSD | Cause | Remedy |
|---|---|---|---|
| **E 09** | BATTERY | Dead battery or memory has not been initialized; occurs if battery fails to keep the RAM alive during power-down; causes DCT2000 to be disconnected | Return DCT2000 for repair; requires factory initialization message |
| **E 10** | SERIALNO | Invalid serial number | Not used at this time |
| **E 11** | INVALID UNIT ADDRESS | Invalid unit address | Return DCT2000 for repair; requires a unit creation message |
| **E 12** | POST ERROR | POST failed | Not used at this time |
| **E 13** | BOOT | Sys_boot initialization failure | Power cycle box; if repetitive, return for repair |
| **E 14** | STARTUP | DCT2000 system startup failure | Power cycle box; if repetitive, return for repair |
| **E 15** | TSI INVALID | TSI structure is corrupted | Power cycle box; if repetitive, return for repair |
| **E 16** | FLASH BAD NUMBER | Bad flash number specified for Initiate Flash Platform | Error logged, ignore |
| **E 17** | BAD PLATVAL | Bad platform validation step number | Error logged, ignore |

**E 00 and E 01 cannot be displayed while the DCT2000 is off. The other errors will display on the LED display when the DCT2000 is off.*

There are five different tuners that could appear on the OSD display:

- V1000D2
- V1000D3C
- V860
- V860D
- V860DL

## d 02: Out-Of-Band (OOB) Status

This diagnostic indicates the status of the out-of-band control channel. Figure B-4 illustrates the Out-Of-Band Status LED display:

**Figure B-4**
**Out-Of-Band Status – LED**

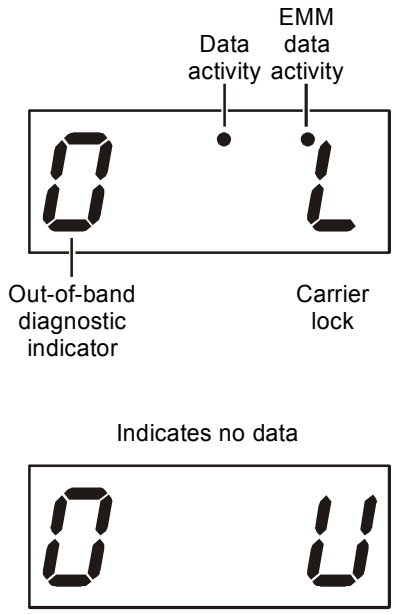



Figure B-5 illustrates the OOB Diagnostic OSD:

**Figure B-5**
**OOB Diagnostic Status – OSD**

```
02  OOB DIAGNOSTIC
    DATA              *       SNR   23 dB GOOD
    EMM DATA          *
    CARRIER LOCK      YES     COUNT          1
    HUNT MODE         None    (For AGILE OOB DCTs
                              only)
    CUR FREQ                  (For AGILE OOB DCTs
                              only)
    LKC                       (For AGILE OOB DCTs
                              only)
    EMM PRVDR ID      0x0001  (For AGILE OOB DCTs
                              only)
    MAN FREQ                  (For AGILE OOB DCTs
                              only)
```

The CARRIER LOCK COUNT is reset to “1” after an initialize from the DAC or a power cycle.

Table B-4 lists the LED and OSD indications of whether the out-of-band control channel is locked to the carrier (this indicator can falsely indicate locked):

**Table B-4**
**LED and OSD indicators for out-of-band control channel**

| LED | OSD | State |
|---|---|---|
| **L** | YES | Carrier locked |
| **U** | NO | Carrier unlocked |

### Data Activity and EMM Data Activity Indicators

The LED EMM Data Activity indicator is lit when a message is present and the Data Activity indicator shows receipt of a message. The OSD indicates with a *, that data has been received.

The indicators cover all packet processors regardless of which stream they are monitoring and are cleared when you enter the diagnostic.

Table B-5 lists how the EMM data activity indicator shows when the DCT2000 is receiving a message on the EMM stream:

**Table B-5**
**Out-of-band EMM data activity indicator – LED and OSD**

| LED | OSD | Status |
|---|---|---|
| **off** | Blank | No data received |
| **on** | * | Data received |

*The DCT2000 can receive only six PIDs at one time. Data on PIDs can be present on the out-of-band multiplex that the DCT2000 is not receiving.*

### Selecting the OOB Frequency

To select the OOB Frequency go to 02 OOB STATUS diagnostic and begin:

1. Press the **MENU** button to enter the frequency selection mode. The frequency of the last known carrier (LKC) displays on the LED. The OSD displays a new MANUAL FREQ line at the bottom of the screen, indicating the LKC frequency.
2. Press the **MENU** key a second time to exit the frequency change mode.

   Or

   Press the **UP/DOWN** channel or cursor keys to scroll through the frequencies to locate the desired OOB frequency. The frequency selection appears on the LED and on the MANUAL FREQ line of the OSD. When you select the last known frequency, a DOT appears in the upper-middle portion of the LED.

The first frequency to display is 75.25. The system scrolls through each frequency until it reaches the last, 103.75, and then scrolls back to the beginning. This diagnostic scrolls through the OOB frequencies in the following order:

- 75.25 MHz
- 104.20 MHz
- 72.75 MHz
- 92.25 MHz
- 98.25 MHz
- 107.25 MHz
- 107.40 MHz
- 110.25 MHz
- 116.25 MHz
- 103.75 MHz

3 Press **SELECT** to begin searching for the OOB frequency. While the DCT2000 searches for a frequency, the LED flashes. On the OSD the MANUAL FREQ line of text clears, the HUNT MODE displays FIX to indicate the fixed frequency search, and the CUR FREQ field changes to the frequency selected to search.

4 If the frequency is found with the proper EMM Provider ID, the LED displays the normal OOB receiver status as shown in Figure B-4. The OSD LKC field changes to display the new frequency.

5 If after 40 seconds the frequency search is not successful, the DCT2000 performs a warm reset and returns to the last known carrier frequency.

6 To abort a search without waiting the 40 seconds, press **POWER** to cause a warm reset.

### Agile Enabled DCT2000 Operation Notes

The DCT2000 LED displays `hunt`:

- After a cold reset from the front panel. This indicates that the DCT2000 is in a round robin hunt mode. The `hunt` message continues to display until the proper stream (EMM provider of 0x0000 or 0x001) is detected.
- After receiving an OOB_processor_config message with EMM_provider_ID that is not equal to the one it is currently using. Receiving this message puts the DCT2000 into the EMM ID Hunt Mode. The `hunt` message continues to display until the proper stream is detected.

## d 03: In-Band Status

The DCT2000 displays the in-band diagnostics for the last attempted channel tune. If a digital carrier is not present, the diagnostics indicate the carrier lock is analog. When the carrier lock is analog, all fields for digital (other than a carrier lock channel) are blank.

Figure B-6 illustrates the In-Band Status as shown on the LED:

**Figure B-6**
**In-Band Status – LED**

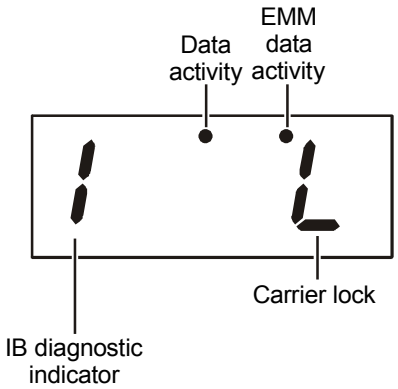



Figure B-7 illustrates the In-Band Diagnostic OSD:

**Figure B-7**
**In-Band Diagnostic – OSD**

| | | | |
|---|---|---|---|
| 03 | IN BAND DIAGNOSTIC | | |
| | DATA | | * |
| | EMM DATA | | * |
| | CARRIER LOCK | | YES |
| | PCR LOCK | | YES |
| | SNR | 36 dB | ssss |
| | MODULATION MODE | | QAM 64 |
| | SHORT TERM ERROR COUNT | | 0000 |
| | LONG TERM ERROR COUNT | | 9999 |
| | TUNED FREQ | | 543.000 |

### Data Activity Indicator – LED and OSD

The data activity indicator lights when the DCT2000 is receiving a message. The indicator is blank when you enter this diagnostic and three seconds after receiving the last message. The indicator covers all packet processors regardless of which stream they are monitoring.

Table B-6 lists the LED and OSD indications:

**Table B-6**
**Data activity indicator – LED and OSD**

| LED | OSD | Status |
|---|---|---|
| **off** | blank | No data received |
| **on** | * | Data received |

### EMM Data Activity Indicator – LED and OSD

Table B-7 lists the LED and OSD indicator lights when the DCT2000 is receiving a message on the EMM stream. The indicator is clear when entering this diagnostic.

**Table B-7**
**EMM data activity indicator – LED and OSD**

| LED | OSD | Status |
|---|---|---|
| **off** | blank | No data received |
| **on** | * | Data received |

### Carrier Lock – LED and OSD

This diagnostic indicates that the digital in-band receiver is locked to the carrier. Table B-8 lists the LED and OSD indications:

**Table B-8**
**In-band carrier lock – LED and OSD**

| LED | OSD | Status |
|---|---|---|
| **L** | YES | Carrier locked |
| **U** | NO | Carrier unlocked |
| **A** | Analog | Analog channel |

### Program-Clock-Reference (PCR) Lock – OSD Only

The PCR lock indicates a program-clock-reference lock with the current digital datastream.

### Signal-To-Noise Ratio (SNR) – OSD Only

The SNR displayed on the OSD is a rough estimate of the carrier signal-to-noise ratio. The SNR displayed is a measure of the QAM cluster variance, which is proportional to the signal-to-noise ratio.

Analog channels display `analog` for carrier lock. The SNR display a number for the numeric value and blank for the ssss value.

A blank display indicates that the digital section of the DCT2000 is still in the initial state. If this occurs, check diagnostic d07.

Table B-9 lists the SNR indicators for the OSD:

**Table B-9**
**SNR indicators – OSD only**

| *ssss* value | Meaning |
|---|---|
| **GOOD** | Good value |
| **FAIR** | Marginal signal level – check the signal |
| **POOR** | Unusable signal |

### Modulation Mode

The modulation mode for analog and digital channels are illustrated in table B-10:

**Table B-10**
**Modulation Mode**

| Channels | Modulation Mode |
|---|---|
| **Analog channels** | Analog |
| **Digital channels** | QAM 64 |
| | QAM 256 |

### Short Term Error Count

The Short Term Error Count polls the FEC errors (maximum count of 65535) at 5-second intervals. The Short Term Error Count is cleared after polling.

### Long Term Error Count

The Long Term Error Count is the accumulation of the Short Term Error Count (maximum count of 65535). The Long Term Error Count is cleared every 24 hours.

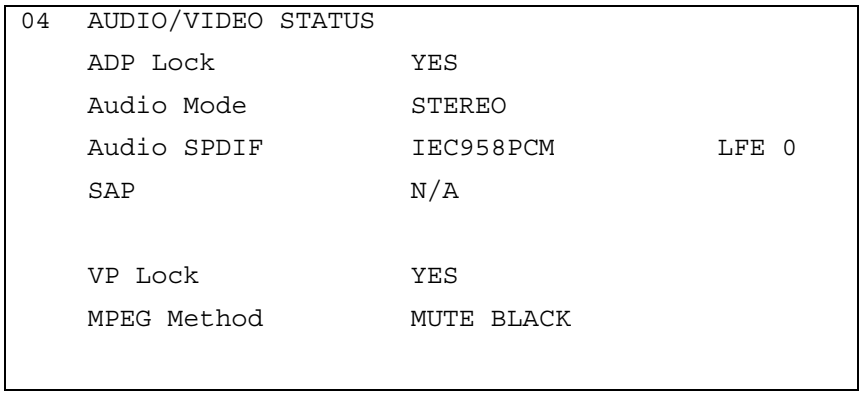
### Tuned Frequency

Tuned Frequency (Carrier Definition Frequency + 1.75 MHz) is the actual frequency the tuner is programmed.

## d 04: Audio/Video Status

This diagnostic displays the audio and video information for the current tuned channel. The audio and video status OSD is illustrated in Figure B-8:

**Figure B-8**
**Audio/Video Status - OSD**




A list of the audio video status information is illustrated in Table B-11:

**Table B-11**
**Audio Video Status**

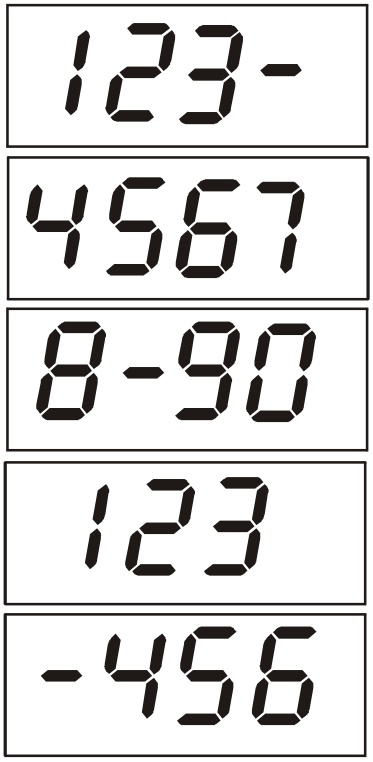
| Status | Description |
|---|---|
| **ADP Lock** | The ADP Lock is the Audio Processor locked status. The ADP Lock displays either YES or NO. |
| **Audio Mode** | The audio modes of the DCT2000 are:<br>▪ N/A<br>▪ Mono<br>▪ Stereo<br>▪ Surround |
| **Audio SPDIF** | The audio SPDIF displays SPDIF modes valid for the DCT2000. The mode is set by the software application that runs on the DCT. The two modes for a non-SPIDIF DCT are:<br>▪ N/A<br>▪ IEC958PCM – AC3<br>The following are SPIDIF configuration modes (K and L DCT models options):<br>▪ 1/0 – Right or left front<br>▪ 2/0 – Right front, left front<br>▪ 3/0 - Right front, left front, center<br>▪ 2/1 - Right front, left front / right or left rear<br>▪ 3/1 - Right front, left front, center / right or left rear<br>▪ 2/2 – Right front, left front / right rear, left rear<br>▪ 3/2 - Right front, left front, center / right rear, left rear<br>▪ LFE - Low frequency effect if “1” signifies Dolby 5.1 |

| Status | Description |
|---|---|
| **SAP** | SAP is the Second Audio Program availability. It displays:<br>▪ N/A (for digital channel)<br>▪ YES (for analog channel)<br>▪ NO (for analog channel) |
| **VP Lock** | The VP Lock is the Video Processor locked status. The VP Lock displays either YES or NO. |
| **MPEG Method** | The MPEG Method selected. The MPEG Methods are:<br>▪ Unmuted<br>▪ Mute Still<br>▪ Mute Black |

## d 05: Unit Address

This diagnostic displays the 16-digit (40-bit) unit address of the DCT2000. It displays in five parts on the four-section LED. The address display stays on each section for five seconds. The location of the dash in each of the five displays is unique. Figure B-9 shows the LED for unit address 123-45678-90123-456:

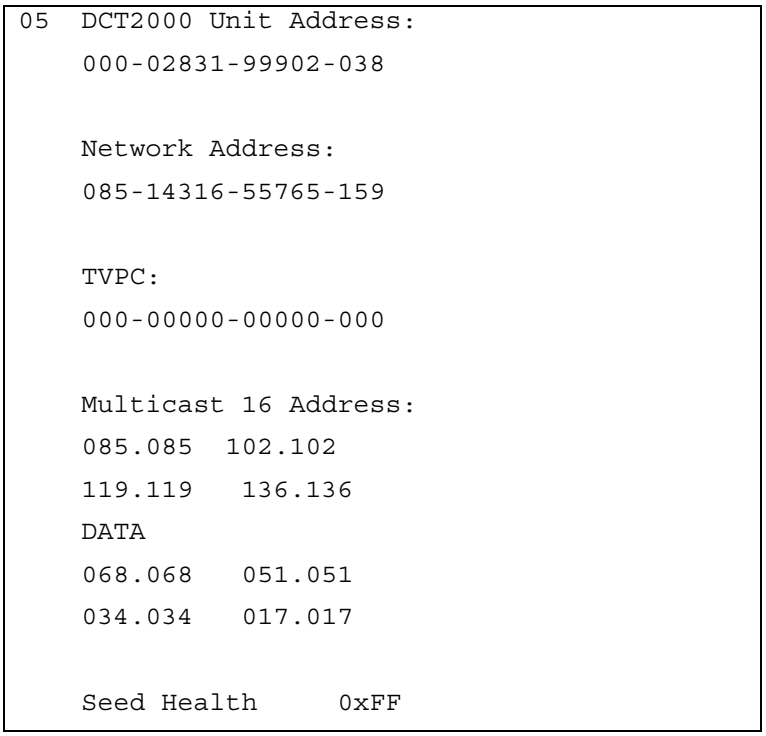
**Figure B-9**
**Unit address - LED**




On the unit address OSD, the unit, network, and TV PassCard (TVPC) addresses are in decimal form (13 address digits and three check digits). The multicast 16-bit address is in TCP/IP decimal byte form.

Figure B-10 illustrates the Unit Address OSD:

**Figure B-10**
**Unit Address - OSD**




The Multicast 16 address numbers change to display the values for each datastream. The following is a list of Multicast 16 addresses:

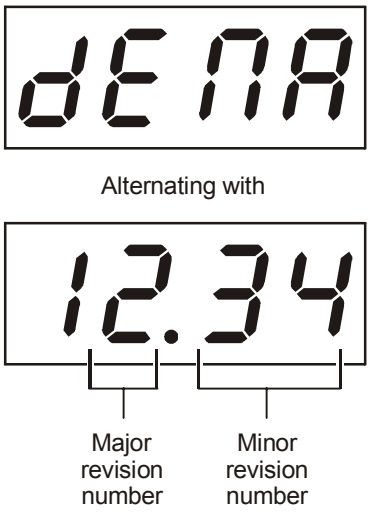
- NET
- EMM
- SCC
- DWLD
- DATA
- VCN
- POLL

Seed Health – This value respresents the health of the DCT and should be 0xFF.

## d 06: Firmware Version

This diagnostic displays the Dena firmware version. Figure B-11 illustrates that the LED alternates between displaying the firmware version number and the characters Dena:

**Figure B-11**
**Dena firmware version - LED**




The Firmware Version OSD displays:

- Dena firmware version or revision number
- The build date and time
- TSODA firmware version number
- CAMEL (CMLBK) firmware version number
- The BOOT is the lowest level of firmware code that can be used on the DCT2000

Figure B-12 illustrates the Dena Firmware Version OSD:

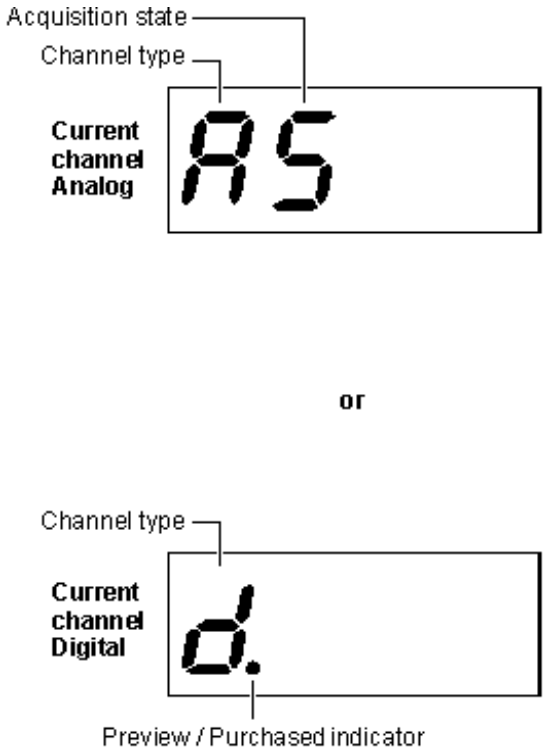
**Figure B-12**
**Firmware Version - OSD**

```
06   FIRMWARE VERSION
     07.44                      BOOT 07.41
     April 12, 2001
     09:31:05

     TSODA t16 (or t14)

     CMLBK 8404
```

## d 07: Current Channel Status

This diagnostic gives the instantaneous status of the last attempted channel tune on the in-band tuner. The status shows channel type (analog/digital), acquisition state, purchasable indicator, preview indicator, parental control status, and mute status. Figure B-13 illustrates a current channel status display on the LED:

**Figure B-13**
**Current Channel Status - LED**




### LED Channel Types

Table B-12 lists the possible channel types:

**Table B-12**
**Channel Types – LED and OSD**

| 1st LED | OSD | Meaning |
|---|---|---|
| **A** | Analog | Analog channel |
| **d** | Digital | Digital channel |

### Acquisition State

Table B-13 lists the acquisition state:

**Table B-13**
**Acquisition state**

| 2nd LED | State |
|---|---|
| **n** | Not connected |
| **I** | Initialized to acquire the program |
| **C** | Configured to acquire the program |
| **A** | Acquiring the program |
| **d** | Not authorized for the program |
| **S** | Authorized for analog program |
| **E** | Authorized for encrypted digital program |
| **U** | Unencrypted digital program |

### Purchasable Indicator – LED and OSD

Table B-14 lists the purchases indicator:

**Table B-14**
**Purchasable status – LED and OSD**

| LED | OSD | Meaning |
|---|---|---|
| **off** | **NO** | Channel is not purchasable at present |
| **on** | **YES** | Channel is purchasable at present |

### Preview Indicator – LED and OSD

Table B-15 lists the preview indicator:

**Table B-15**
**Preview status – LED and OSD**

| LED | OSD | Meaning |
|---|---|---|
| **off** | **NO** | Channel is not in preview |
| **on** | **YES** | Channel is in preview |

### Parental Control - LED and OSD

Table B-16 lists the parental control indicator:

**Table B-16**
**Parental Control –LED and OSD**

| OSD | Meaning |
|---|---|
| **NO** | Parental Control is not active |
| **YES** | Parental Control is active |

There is no indicator on the LED for Parental Control.

### Mute Status

Table B-17 lists the mute indicator:

**Table B-17**
**Mute –LED and OSD**

| OSD | Meaning |
|---|---|
| **NO** | Mute is not active |
| **YES** | Mute is active |

There is no indicator on the LED for Mute status.

### Current Channel Status - OSD

The Current Channel Status OSD has the following fields:

- The TYPE field indicates whether the current channel is analog or digital.
- The STATUS field indicates the channel type. The types of status are:
  - Authorized
  - Unauthorized
  - Encrypted
  - Unencrypted
- The CONNECTED field indicates whether the DCT2000 is connected or disconnected. If the value is connected, the program is viewable.
- The PREVIEW field indicates that the program is in the free preview state. The field displays YES or NO.
- The PURCHASABLE field indicates if the current or next program can be purchased. The field displays YES or NO.
- The PURCHASED field indicates if the current or next program has been bought. The field displays YES or NO.
- The EPOCH NUM field is for Motorola use only [refer to TSODA GATEKEEPER INTERFACE PROTOCOL document #DCII-093-052, Service Status Reply for description of current_program_epoch_number and next_program_epoch_number].

- The EPOCH TYPE field is for Motorola use only [refer to TSODA GATEKEEPER INTERFACE PROTOCOL document #DCII-093-052, Service Status Reply for description of current_epoch_status and next_epoch_status].
- The AUTH field is for Motorola use only [refer to TSODA GATEKEEPER INTERFACE PROTOCOL document #DCII-093-052, Service Status Reply for description of current_epoch_auth_reason and next_epoch_auth_reason].
- The SERVICE field is for Motorola use only [refer to TSODA GATEKEEPER INTERFACE PROTOCOL document #DCII-093-052, Service Status Reply for description of service_number].
- The STATUS field is for Motorola use only [refer to TSODA GATEKEEPER INTERFACE PROTOCOL document #DCII-093-052, Service Status Reply for description of service_status].
- The ID field is for Motorola use only [refer to TSODA GATEKEEPER INTERFACE PROTOCOL document #DCII-093-052, Service Status Reply for description of service_ID].
- The CH indicates the channel currently tuned when the OSD screen displayed.
- The TUNED FREQ (Carrier Definition Frequency + 1.75 MHz) is the actual frequency the tuner is programmed.

Figure B-14 illustrates the current channel status display on the OSD:

**Figure B-14**
**Current Channel Status - OSD**

```
07   CURRENT CHANNEL STATUS

     TYPE  DIGITAL            aaa  bb
     STATUS                   ccccc
     CONNECTED                dddd
     PREVIEW                  NO

                              CURR        NEXT
     PURCHASABLE              NO          --
     PURCHASED                NO          --
     EPOCH NUM                0X0         1
     EPOCH TYPE               0x0         0x0
     AUTH                     0X0         0X0

     SERVICE 0  STATUS  1 ID  0X0004 0X00
     CH 204     TUNED FREQ    543.000
```

### Current Channel Status – OSD fields

Table B-18 lists the Current Channel Status OSD fields:

**Table B-18**
**Current channel status – OSD fields**

| OSD variables | State |
|---|---|
| ***aaa*** | Analog – blank<br>For digital only:<br>▪ ENC – encrypted<br>▪ UNE – unencrypted |
| ***bb*** | current epoch authorization reason in the current_epoch_auth_reason field. This is displayed in hex:<br>00 – missing program re-key<br>01 – missing working key epoch message<br>02 – missing event blackout message<br>03 – missing category rekey<br>04 – old category sequence in program, rekey message<br>10 – program bought<br>11 – program bought without taping<br>12 – subscribed with taping<br>13 – subscribed without taping<br>14 - subscribed with taping purchasable<br>15 – IPPV with taping<br>16 – IPPV without taping<br>20 – bad seed checksum<br>21 – bad debit buffer checksum<br>30 – IPPV not enabled<br>31 – insufficient credit to purchase<br>32 – show count limit exceeded<br>33 – debit register will overflow<br>34 – no AFP records available<br>36 – maximum package cost exceeded<br>37 – no IPPV overlay in message<br>40 – not subscribed<br>41 – regional blackout<br>42 – event blackout |
| ***ccccc*** | INIT – Initialized state<br>CONFI – Configured<br>ACQUI – Acquiring the program<br>AUTH – Authorized for the program<br>Not A – Not authorized for the program |
| ***ddd*** | blank – Connected<br>NOT – Not connected |

## d 08: Renewable Security System

The renewable security system includes a TVPC card that returns the security status to current. The status LED includes whether the TVPC is required, the mode, status, and version.

Figure B-15 illustrates the Renewable Security Status LED:

**Figure B-15**
**Renewable Security Status - LED**

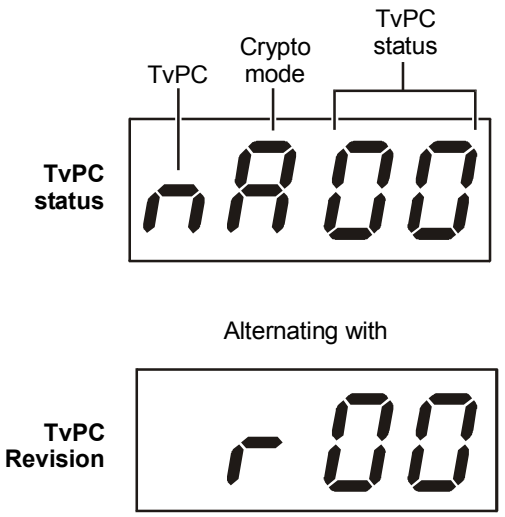



Figure B-16 illustrates the Renewable Security OSD:

**Figure B-16**
**Renewable Security – OSD**

```
08   RENEWABLE SECURITY

     TVPC NOT REQUIRED
     CRYPTO     NOT MATED
     STATUS     00
     VERSION    00
```

### TVPC Required – LED and OSD

Table B-19 shows how the LED and OSD indicate whether further operation of the DCT2000 requires the TVPC:

**Table B-19**
**TVPC required**

| LED | OSD | Status |
|---|---|---|
| **n** | NOT REQUIRED | TVPC not required |
| **Y** | IS REQUIRED | TVPC is required |

### Crypto Mode

Table B-20 lists the current mode as displayed on the LED and the OSD:

**Table B-20**
**Crypto mode**

| LED | OSD | Status |
|---|---|---|
| **A** | STAND ALONE | Stand alone |
| **S** | SUPPORT | Support |
| **n** | NOT MATED | Not mated |

### Status

Table B-21 shows the TVPC status as displayed on the LED and the OSD:

**Table B-21**
**TVPC status**

| LED and OSD | Status |
|---|---|
| **00** | OK |
| **01** | TVPC communication problem |
| **02** | TVPC required |
| **03** | Validator does not match between GK and TVPC |
| **04** | Invalid unit key number |
| **05** | Old TVPC unit address |
| **0a** | TVPC not mated |
| **0b** | TVPC /base module unit address mismatch |
| **0C** | New TVPC, but wrong version number |
| **0d** | TVPC unit address mismatch |

**Version**
The version of renewable security being used is displayed in this field.

## d 09: Upstream Modem Status

These diagnostics display the appropriate set of STARVUE II (RF) and STARFONE (telephone) modem information based on the module installed in the DCT2000.

### STARVUE II (RF) Diagnostics

This diagnostic shows the status and operating parameters for the STARVUE II RF return. Figures B-17 and B-18 illustrate the parameters for testing. Figure B-17 illustrates the STARVUE II diagnostics LED:

**Figure B-17**
**STARVUE II diagnostics LED**

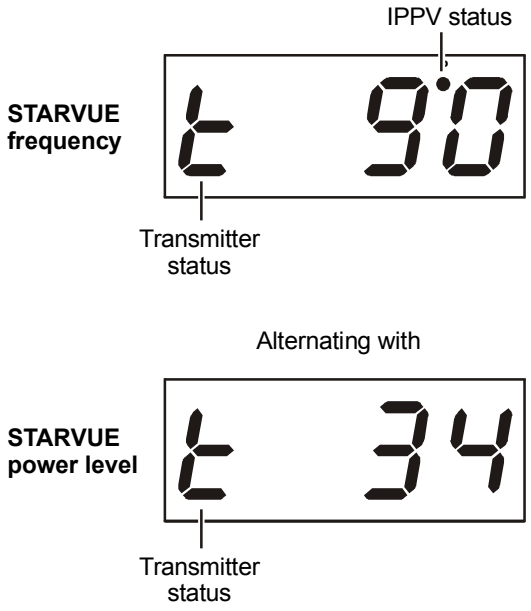



Figure B-18 illustrates the STARVUE II Diagnostics OSD:

**Figure B-18**
**STARVUE II Diagnostic - OSD**

```
09   STARVUE II DIAGNOSTICS
     STATUS:                    DISABLED
     FREQUENCY:                 23.000 MHz
     LEVEL:                     39
     IPPV:                      DISABLED

     LAST POLL REQ:             170
     6-15-2001  20:49:33
```

```
LAST POLL ACK:              170
6-15-2001  20:49:33
```

Table B-22 lists the STARVUE II transmitter status:

**Table B-22**
**STARVUE II transmitter status**

| LED and OSD | Indicator |
|---|---|
| **-** | Idle |
| **t** | Transmitting |

The FREQUENCY field indicates the transmitting frequency.

The LEVEL field indicates the approximate power value of the STARVUE II transmitter in dBmV. The difference between the power value on the diagnostic screen and the actual power of the STARVUE II module may be ± 5 dBmV.

Table B-23 shows how the LED and OSD indicate the IPPV status:

**Table B-23**
**STARVUE II IPPV status**

| LED | OSD | Mode |
|---|---|---|
| **on** | ENABLED | IPPV enabled |
| **flashing** | UNSENT – ## | The DCT2000 contains unsent IPPV transactions |
| **off** | DISABLED | IPPV disabled |

The variable –## is the number of unsent transactions.

The LAST POLL REQ field contains the sequence number of the last poll request received by the DCT2000. The time stamp of the last poll request will be displayed immediately below LAST POLL REQ. If no poll request has been received by the DCT2000, the sequence number field will display N/A and the time stamp field will display N/A. If a poll request has been received by the DCT2000 but the system time of the DCT2000 has not yet been initialized, the time stamp field will display NOT AVAILABLE.

*The LAST POLL ACK field contains the sequence number of the last poll acknowledge received by the DCT2000. The time stamp of the last poll acknowledge will be displayed immediately below LAST POLL ACK. If no poll acknowledge has been received by the DCT2000, the sequence number field will display N/A and the time stamp field will display N/A. If a poll acknowledge has been received by the DCT2000 but the system time of the DCT2000 has not yet been initialized, the time stamp field will display NOT AVAILABLE.*

### STARFONE Diagnostics

This diagnostic shows the status and operating parameters for the STARFONE module. Figure B-19 illustrate the STARFONE diagnostics LED:

**Figure B-19**
**STARFONE diagnostics - LED**

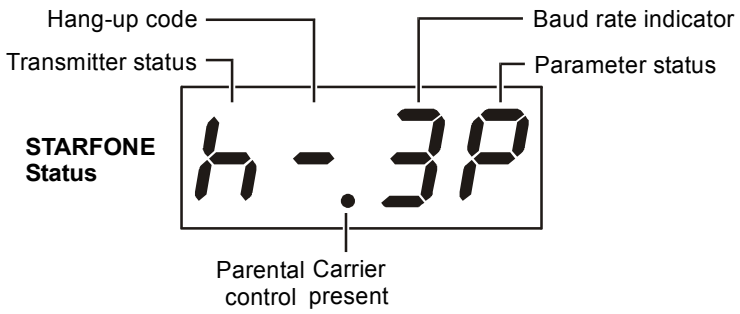


Figure B-20 illustrates the STARFONE Diagnostics OSD:

**Figure B-20**
**STARFONE Diagnostic - OSD**

```
09   TELEPHONE MODEM

     TYPE:                    STARFONE 14.4K

     PARAMETERS             : Not Verified
     BAUD RATE              : 300
     DATA FRMT              : 8, EVEN

     PHONE NUMBERS
     #1                     : 3435556666
     #2                     : 3435556667

     LAST POLL REQ          : 170
     6-15-2001  20:49:33
     LAST POLL ACK          : 170
     6-15-2001  20:49:33

     BUSY COUNT             : 0
     NO ANSWER COUNT        : 0
     LOST CARRIER COUNT     : 0

     CARRIER                :

     STATUS:
       HANGUP-NORMAL
```

The TYPE field describes the type of modem and the speed.

Table B-24 lists the STARFONE fourth-digit telephone parameters:

**Table B-24**
**STARFONE fourth-digit parameter status**

| LED | OSD | Mode |
|---|---|---|
| — | **NOT SET** | Telephone parameters not set |
| **P (flashing)** | **NOT VALID** | Telephone parameters not valid |
| **P (solid)** | **SET** | Telephone parameters OK |

Table B-25 lists the STARFONE third-digit baud rate:

**Table B-25**
**STARFONE third-digit baud rate**

| LED | OSD | Mode |
|---|---|---|
| **3** | **300** | 300 Baud |

DATA FORMAT is the modem protocol.

PHONE NUMBERS are the numbers that the modem will dial.

Table B-26 lists the STARFONE transmitter status:

**Table B-26**
**STARFONE transmitter status**

| 1st Digit | 2nd Digit | Meaning |
|---|---|---|
| **h** | * | On hook (* = hang-up code) |
| **t** | – | Test for line available |
| **d** | – | Dialing |
| **A** | – | Waiting for answer |
| **c** | **R** | Communicating, receiving |
| **c** | **T** | Communicating, transmitting |
| **c** | – | Communicating, idle |
| **r** | * | Waiting for retry (* = hang-up code) |

The LAST POLL REQ field contains the sequence number of the last poll request received by the DCT2000. The time stamp of the last poll request will be displayed immediately below LAST POLL REQ. If no poll request has been received by the DCT2000, the sequence number field will display N/A and the time stamp field will display N/A. If a poll request has been received by the DCT2000 but the system time of the DCT2000 has not yet been initialized, the time stamp field will display “Not available.”

The LAST POLL ACK field contains the sequence number of the last poll acknowledge received by the DCT2000. The time stamp of the last poll acknowledge will be displayed immediately below LAST POLL ACK. If no poll acknowledge has been received by the DCT2000, the sequence number field will display "N/A" and the time stamp field will display "N/A." If a poll acknowledge has been received by the DCT2000 but the system time of the DCT2000 has not yet been initialized, the time stamp field will display NOT AVAILABLE. Table B-25 lists the STARFONE hang-up code:

**Table B-27**
**STARFONE hang-up code**

| Mode | Status |
|---|---|
| **–** | Normal hang-up |
| **A** | Answer time-out |
| **r** | Phone ringing |
| **c** | Carrier loss |
| **L** | Line in use |
| **E** | Errors (data) |
| **U** | User line request |
| **P** | Parameters invalid |
| **t** | Data timeout |
| **C** | Communication protocol fault |

## d 10: Application (APP) Code Modules

This diagnostic displays the currently downloaded code modules. This can be a multi-page display. Press **SELECT** to display additional pages. The LED shows the downloaded status.

The LED diagnostic indicates the current download status. The data received indicator lights when downloaded data is received. The download packet counter counts down toward zero, indicating the remaining packets of the current module to be received. This counter will initially be blank, and after segment zero is received it shows the remaining packets. The data received indicator can be lit even if no additional packets are stored.

Figures B-21 and B-22 illustrate the application code module for LED and OSD:

**Figure B-21**
**Application code module - LED**

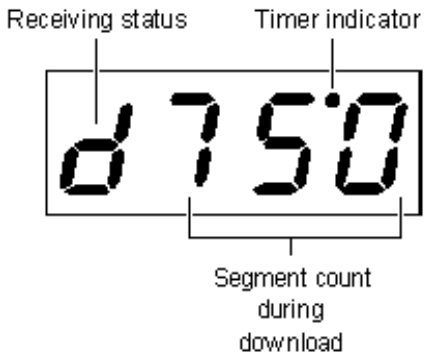



Table B-28 lists the mode for the first LED that indicates the current status of the download:

**Table B-28**
**First LED indicating current status of download**

| First LED | Mode |
|---|---|
| **I** | Idle – no download in progress |
| **C** | Connected to download PID – awaiting data |
| **d** | Download in progress |

Figure B-22 is an example of an OSD screen for a DCT2000 that contains ROM.

**Figure B-22**
**APP Code Modules – OSDs**

```
10     APP CODE MODULES

       MODULE          VER         STATUS    ID

       DCT_ROM         05.88       DISABLD   0000
       Dct_plat        07.44       ENABLED   0001
```

```
        Appl_____       02.00       DOWNLD    07DA
```

Or

```
10      APP CODE MODULES

        MODULE          VER         STATUS    ID

        Dct_plat        07.44       ENABLED   0001
        Appl_____       02.00       DOWNLD    07DA
```

*The DCT2000 model version indicates if a DCT_ROM module is installed. All DCT2000s with module version 6.X and below have a DCT_ROM module installed. All DCT2000s with module versions 7.X and higher are ROMLESS.*

### Status Modes

The STATUS modes available are:

- LOADING
- DELETED
- ENABLING
- ENABLED
- DSABLNG
- DISABLD
- DELETNG
- POSTPND
- ENNORUN
- DISNORUN

## d 11: Memory Config

There is no LED for this diagnostic. The format of the OSD depends on the installed memory types. The PLATFORM shows sizes of memory types allocated to platform code. The APPLICATION shows sizes of memory types allocated to application code. The SYSTEM HEAP shows breakdown of DRAM allocations.

Figure B-23 illustrates the Memory Status OSD:

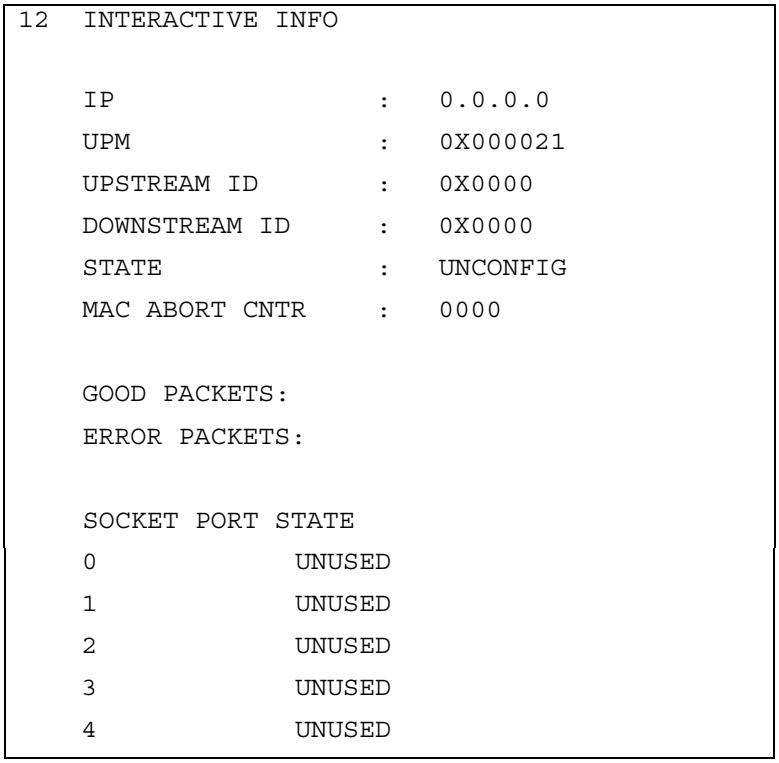
**Figure B-23**
**Memory Status OSD**

```
11   MEMORY STATUS

     EEPROM VER.NO.                          00.00

                     PLATFORM                APPLICATION
     NVMEM           256k                    20k
     DRAM            512k                    1.5M
     FLASH           1M                      1M
     ROM             1M                      n/a

     SYSTEM HEAP
       PgSz    PgCnt   Alloc   Used    Fail
        256      594     n/a    237       0
          8        1      32      0       0
         16        1      16      5       0
         32        3      24      9       0
         64       76     304    289       0
        128       13      26     20       0
```

## d 12: Interactive Info

The Interactive Info menu is a diagnostic tool used to gather information about your system. Figure B-24 illustrates the OSD of the Interactive Info menu. There is no LED for the Interactive Info menu.

**Figure B-24**
**Interactive Info menu - OSD**




### State

The different modes for the STATE are:

- MAC CONNECT
- UNCONFIG
- INIT_WAIT_DC_OR_
- WAIT_LM_ACK
- WAIT_SO_ACK
- WAIT_LA_OR_SO
- INIT_STOPPED
- RUN_WAIT-DC-OR-C
- RUNNING
- RUN_STOPPED
- INVALID

### Socket Port State

The different modes for the SOCKET PORT STATE are:

- UNUSED
- OPENED
- READY
- RECVING
- SENDING

## d 13: MAC Frequency Table

The DCT2000 uses a range of frequencies set by the host for upstream communications. Figure B-25 is an example of the Mac Frequency Table OSD that will display your frequency and signal power:

**Figure B-25**
**Mac Frequency Table - OSD**

```
13  MAC FREQUENCY TABLE

    FREQ        POWER
```

## d 14: Message Types

This diagnostic displays a listing of PIDs and counts. In addition the message types with IDs and counts are shown.

**Figure B-26**
**Message Types - OSD**

```
14  MESSAGE TYPES (hex data)

    OOB:                  INB:
     PID          Cnt      PID   Cnt    Lost  DRAM
    0000          0        0000  4      0     0
    0000          0        0000  2      0     0

    ___                    ___
    Msg           Id       Cnt   Msg    Id    Cnt
    0             -        216   9A     E     0
    1             2        89    A0     15    0
```

## d 15: In Band Program Association Table (PAT)

This diagnostic displays the Program Association Table Information. (For Motorola use only).

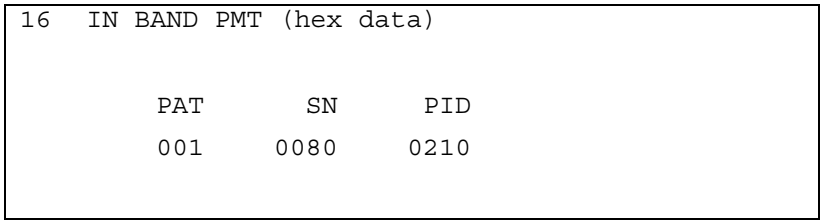
**Figure B-27**
**In Band PAT - OSD**

```
15  IN BAND PAT (hex data)

        PAT       SN      PID
        001     0001      0029
```

## d 16: In Band Program Map Table (PMT)

This diagnostic displays the Program Map Table information. (For Motorola use only).

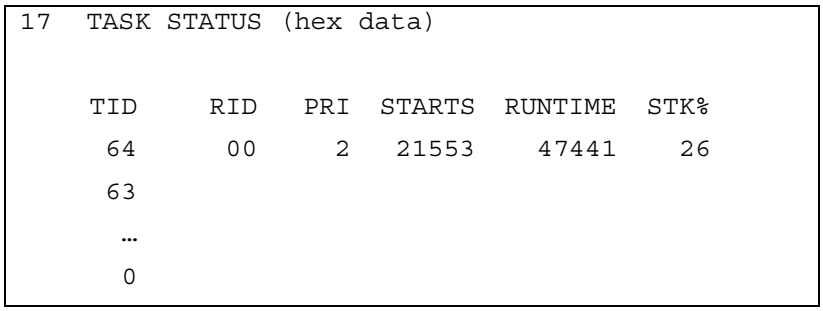
**Figure B-28**
**In Band PMT – OSD**




## d 17: Task Status

This diagnostic displays a listing of tasks. (For Motorola use only).

**Figure B-29**
**Task Status - OSD**




## d 18: Keyboard/LED

This diagnostic is used to verify the functionality of the LED and front-panel keys. The LED diagnostic indicates the currently pressed key. One segment on each row is lit corresponding to the front-panel key. Each character is highlighted while the front panel key is held.

Figure B-30 illustrates the keyboard diagnostic OSD:

**Figure B-30**
**Keyboard diagnostic – OSD**

*Press power button to exit OSD screen and return DCT to off state.*

*Press any key on the remote control to exit the keyboard diagnostic and display the Main menus.*

# Abbreviations and Acronyms

| | |
|---|---|
| **CSR** | Customer Service Representative |
| **DCT2000** | Digital Consumer Terminal 2000 |
| **EMM** | entitlement management message(s) |
| **HRC** | harmonically related carriers |
| **IPG** | interactive program guide |
| **IPPV** | Impulse Pay-Per-View |
| **IR Blaster** | Infrared Blaster |
| **IRC** | incrementally related carriers |
| **MPAA** | Motion Picture Advisory Association |
| **NVOD** | Near Video on Demand |
| **NVRAM** | Non-volatile random-access memory |
| **OSD** | on-screen display |
| **PCR** | program clock reference |
| **PID** | packet identifier |
| **PPV** | Pay-Per-View |
| **QAM** | quadrature amplitude modulation |
| **QPSK** | quadrature phase shift keying |
| **RSA** | Return for Service Authorization |
| **TCP/IP** | Transmission Control Protocol/Internet Protocol |
| **TRC** | Technical Response Center |
| **TvPC** | TV PassCard |
| **VOD** | Video on Demand |

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